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Geoscientists
Manitoba

THE KEYSTONE PROFESSIONAL

WINTER 2016

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Email: apegm@apegm.mb.ca

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THE KEYSTONE PROFESSIONAL

The official publication of Engineers Geoscientists Manitoba



WINTER 2016

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3rd Floor – 2020 Portage Avenue
Winnipeg, MB R3J 0K4
Ph: 204-985-9780 Fax: 204-985-9795
Email: info@kelman.ca
www.kelman.ca

Managing Editor: Scott Kelman
Art Design/Production: Jackie Magat
Marketing Manager: Jeff Kutny
Advertising Coordinator: Stefanie Hagidiakow

Send change of address to:
The Keystone Professional,
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Grand Aspirations

Have you ever asked yourself: What are my grand aspirations for our professions? At first this may appear to be an exercise in day dreaming or developing stretch goals that can never really be achieved. However many achievements start with aspirations. As a long time volunteer with Engineers Geoscientists Manitoba and Engineers Canada, such personal aspirations are often what keep me motivated to volunteer.

As professional engineers and geoscientists, we continuously develop our skills and expertise. We may even become a subject matter expert.

However, it may be prudent to consider how our work - including knowledge, design, or other contributions - is part of the larger picture. As a supervisor of engineering interns, I enjoy the discussion that often occurs as a result of the questions on progress reports. Questions about identifying stakeholders considered in decision making, and about the social impact of one's work are a great platform to discuss how a specific assignment relates to the big picture.

Two of my grand aspirations for the professions are that all engineers and geoscientists are proud and happy

with their careers, and that the public respects and appreciates engineers and geoscientists. I see the opportunity to consider these aspirations in the context of Council's current initiative to review and update the Association's Ends.

The Ends are important because these are the specific objectives and direction that Council gives our CEO. Ends define what the Association is for, rather than what it does¹. In developing good Ends, we consider the following: What benefit does this End provide? For whom does the Ends provide benefit? Are the benefits worth the cost? The Ends become like a strategic plan for the Association. Many members and volunteers will note that the purpose of a committee or task group is usually to achieve one or more of the Ends.

I am very honoured to serve as President of Engineers Geoscientists Manitoba for the 2016-2017 year. I look forward to meeting members and being part of the volunteer effort that is required for self-regulation. I also look forward to connecting with engineering and geoscience communities across Canada to learn promising practices, and gain an understanding of current priorities and initiatives in the larger community.

I hope that I have encouraged you to contemplate your grand aspirations for the professions and that we may be able to work towards these aspirations through initiatives in the upcoming year. I welcome your questions and discussion about the professions. I can be contacted at president@apegm.mb.ca.

¹ Ends information is from The Governance Coach, a registered trademark of Janice Moore and Associates www.governancecoach.com

“ I look forward to meeting members and being part of the volunteer effort that is required for self-regulation. ”

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Season of Celebration

The season of celebration is upon us at this time of year. The tradition my family follows is Christmas. Engineers and geoscientists are a diverse group from all over the world; celebrating different festivals and traditions. During the holiday season, my wife and I will enjoy the hospitality of many members. Already, I have enjoyed the hospitality of the Filipino, India, and Chinese chapters. Whatever your tradition is, enjoy the food, fun, and fellowship of co-workers, colleagues and friends during this season of celebration.

Ingenium

At the end of October, Engineers Geoscientists Manitoba celebrated the completion of another year of regulating the professions on behalf of the public of Manitoba. The Ingenium conference week was full of activities and events celebrating new members, Life Members, outstanding service, and welcoming out-of-town guests to our province. The week included

the Ingenium professional development day and Annual General Meeting where many members attended for the first time. Vigorous debate took place at the AGM on some new By-laws, resolutions, and the composition of Council. I always enjoy seeing members engaged in matters that concern the future of their Association. I hope you too found some new insights after attending the Ingenium conference week.

Ad Campaign

Have you seen the Winnipeg Transit engineering buses, the billboards, or the trailers at the movie theatre and during the supper hour news? The tag line is "An Engineer Was Here!" Preliminary survey research indicated that 4 out of 10 Manitobans recognize the designation "P.Eng." and know what it means.



Engineers Geoscientists Manitoba is trying to bump this number up; increasing the public's awareness of P.Eng. and P.Geo. through this advertising campaign.

Meet Youssef

I had the opportunity to meet a new member at Ingenium. Youssef is a civil engineer from Syria. He took the day off from his job to volunteer at the Ingenium PD day. He has been in Canada two years and has not obtained an engineering position yet, however he is hopeful that will occur soon. He has ten years of practice experience as a project manager on large infrastructure projects. It was a pleasure meeting this new member and learning about the engineering skills he has brought to our province from the far-away country of Syria.

Lapel Pin Offer

In a previous issue of the KP Magazine I wrote about branding and marketing in an article titled: "This is Your Brand." Near the bottom, I spoke about the new lapel pins. Many readers sent me an email requesting a pin. We still have more pins. If you'd like one, just send me an email and I will send you one. We have stainless steel P.Eng. pins for engineers and brass P.Geo. pins for geoscientists.



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Dr. M.G. Britton,
P.Eng. FEC

Applying the Code of Ethics

The Engineers Geoscientists Manitoba Professions Act is the document that defines the legal foundation for Engineers and Geoscientists to practice our professions in Manitoba. Within that Act

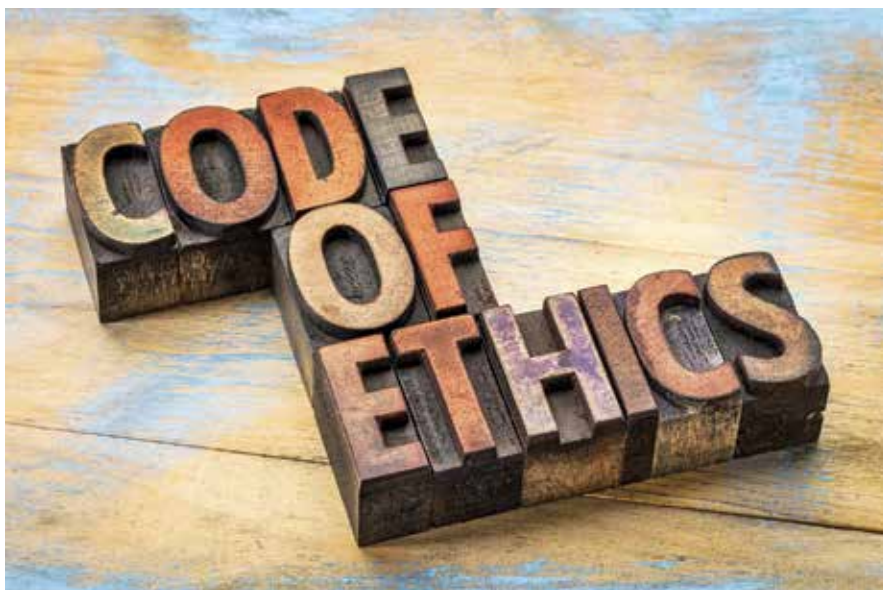
is a stipulation that the professions must create, and its members must comply with, a Code of Ethics. Our current Code has gone through a number of revisions over the years and the current

edition was approved by Council on May 9, 2000, and adopted by By-Law December 14, 2000. It is available on the Association website.

Details of the Code of Ethics have resurfaced in my life because I am currently supervising a PhD. student who is developing an engineering ethics 'learning platform' using a video game format. Throughout this study, we have concentrated on clarifying, and reinforcing, our understanding of numerous definitions and concepts. It has been an interesting experience that will, we hope, be formalized by his graduation in the spring of 2017. But issues that we have discussed beyond those incorporated in his thesis will stay with both of us well into the future.

One of the greatest benefits of working with graduate students is the fact that they cause you to ponder your personal understanding of their area of inquiry. Typically I spend some time checking out definitions for, and explanations of words that relate, directly or indirectly, to the subject matter area. In this specific case, given that our Act requires compliance with the Association Code of Ethics, it seemed reasonable that both 'Code' and 'Ethics' were words worth exploring. I eventually settled on 'a set of conventions governing behavior' for Code and 'motivation based on ideas of right and wrong' for Ethics. Nothing profound, but a place to start.

With my 'definitions' in my pocket, I took another look at our Code of Ethics. Fundamental Canons 2 thru 5, and their accompanying Canons of Conduct, seem to provide a logical foundation upon which professional practice can be based. However, Fundamental Canon 1,



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“Each practitioner shall obey the laws of the land,” seemed to have broader implications than the other four. In my opinion, Canons of Conduct 1.2 and 1.3, relate to specific situations of professional practice with respect to obeying the ‘laws of the land’. However, Canon of Conduct 1.1, “obey the laws of the land,” is just an abbreviated restatement of the Fundamental Canon. Given that repetition is commonly used to draw attention to a specific point, this got me wondering. Where does one draw the line when applying Canon of Conduct 1.1? As I pondered this theoretical situation, I recalled an instance many years ago in which a licensed engineer had been found guilty of a criminal offence and had been sentenced to a term in federal prison. The Association was advised of the situation and it was recommended that he should lose his license to practice based on his violation of Canon 1 of our Code of Ethics. There was considerable discussion surrounding this recommendation. The argument against removing him from membership was founded on the fact that he had not demonstrated technical incompetence.

Ultimately Canon 1 was applied, and the individual lost his license. I felt, and still feel, comfortable with that decision.

Very early in our school years we are, or at least were, taught that in Canada, the ‘rule of law’ prevails. There are literally thousands of laws that govern our daily lives. Some situations, and some laws, seem to be straight forward without further elaboration. Some require explanation and interpretation. Maybe, that ‘rule of law’ concept is not quite as simple as it once seemed.

Specifically, within the practice of engineering, we need to consider how far down the ‘scale of justice’ should/can Canon 1 be applied? Does the use of the word ‘shall’ in the Fundamental Canon statement imply that we have an option? Would it make a difference if ‘shall’ was replaced with ‘must’?

I used the term ‘scale of justice’ in the previous paragraph. This, for me,

is a means of classifying how society views the seriousness associated with violating laws. Receiving a parking ticket, or a speeding ticket, seem to be socially acceptable. Driving ‘under the influence’ seems to be ok, unless it results in serious injury or death. On the other hand, marketing street drugs or bank robbery seem to be taken much more seriously. Is there, in fact, a point at which the ‘law’ is not relevant? More specifically, from the perspective of engineers and geoscientists, should

Canon of Conduct 1.1 of our Code of Ethics be reconsidered?

The current Canon is vague, and probably unenforceable in many instances. It has a lot in common with the definition of Ethics, “a set of conventions governing behavior”, that I have admitted to accepting. Maybe I’d be better off with the student’s mother’s suggestion that ‘ethics is what you do when no one is watching’.

And yes, some ‘discussions’ lead to more questions, not answers. ☺



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BEFORE

Thoughts on Engineering Design

... and shifting design constraints.

Dr. M.G. Britton, P.Eng. FEC

Earlier this past October the House of Commons ratified the Paris Agreement on climate change. The Agreement, and the emissions reductions it imposes, have been met with international enthusiasm. President Obama even suggested it marked “a turning point for our planet”.

But we have seen this sort of international ‘agreement’ before. In 1992 the United Nations Framework Convention on Climate Change was presented as a protocol that would prevent runaway climate change. Further international negotiations resulted in the 1997 Kyoto Protocol, a document that contained specific emission reduction targets. Canada, and 191 other jurisdictions, signed onto Kyoto. It is probably fair to say that neither of those 20th-century agreements has had any significant impact. It is too soon to judge the Paris Agreement. Unfortunately history isn’t on the side of optimism.

Regardless of which international agreements may have been ratified or abandoned, global warming and climate change are still ‘hot button’ issues. Public opinion has been shaped by numerous studies based on both current and historic environmental data. A majority, but certainly not all, of these studies identify human input as the prime cause of our current situation. As a result, the international agreements we have seen to date have been founded on the assumption that human input is the fundamental cause of these undesirable changes and that human input can be changed, or at least regulated. It follows, therefore, that climate change agreements have sought to deal with our environmental problems by limiting ‘undesirable’ inputs.

It may be somewhat cynical to suggest that the specified limits were established based on a blend of research and political will. Notwithstanding the specifics, there is no doubt that the pressure is on to ‘do something’.

This isn’t a new situation for engineers. Here in Manitoba our Act states that the “practice of professional engineering ... concerns the safeguarding of life, health, property, economic interests, the public interest or the environment”. Cannon 2 of our Code of Ethics requires that “Each practitioner shall regard the physical, economic and environmental well-being of the public as the

prime responsibility in all aspects of professional engineering ... work”. Protecting the environment has always been a part of our responsibilities. We rely on science to help us understand what we might be able to do, but it is our responsibility to decide how it can be done.

In his book, *Engineering Philosophy*, Louis Bucciarelli suggested that “...

“Protecting the environment has always been a part of our responsibilities. We rely on science to help us understand what we might be able to do, but it is our responsibility to decide how it can be done.”

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engineering knowledge is aimed at doing, at making, at producing the new; its focus is not on the past . . .". He goes on to note that "In engineering we see the world through glasses that let through the instrumental, the calculable, alone: the rest of the world is but a haze. . . . We do need to see the world differently". Yes, we do need to take a broader perspective, but, as professionals, we work within the constraints of codes and standards that are applicable to specific areas of expertise. These codes and standards are usually both time and location dependent. At some time in the past the hard and fast limits within those codes and standards were developed on the basis of what was considered to be 'acceptable'.

As a profession, we have always had difficulty attempting to define what is 'acceptable', given that 'acceptable' is a moving target. I remember an assignment in a Sanitary Engineering class during my last year as an undergraduate at the University of Saskatchewan. In keeping with the standards of the day, Saskatoon was discharging 'partially treated' sewage into the South Saskatchewan River. At the point of input, both COD and BOD (chemical/biological oxygen demand) levels were 'excessive'. Our assignment was to determine the distance downstream at which the river water would return to 'acceptable' standards. In retrospect, this assignment met with a widely held mid-20th century view that 'the solution to pollution is dilution'. Apparently, at that point in time, this sort of calculation satisfied the responsibility to consider the environmental well-being of the public. There is no doubt that, to quote Bob Dylan, "the times they are a-changin".

In the view of many persons, including many engineers, the pressure to 'do something' falls squarely on the shoulders of the engineering profession. However, as we take on this challenge, our focus needs to shift from the parts that make up a system to include the system in general.

Fewer emissions per car will reduce one source of undesirable environmental inputs. But so will fewer cars. And that takes us back to Bucciarelli's suggestion that ". . . we do need to see the world differently". ☘



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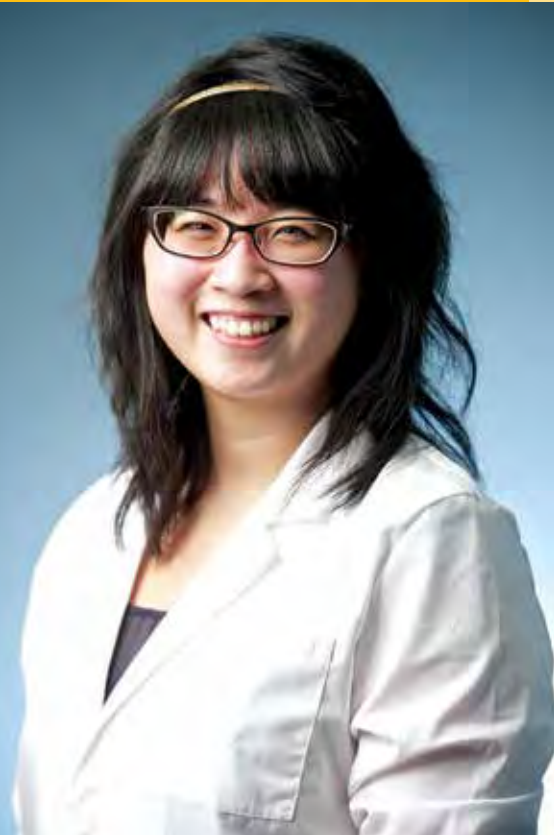
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FLOOD PROTECTION IN MANITOBA

By Patrice Leclercq, P.Eng. and Colin Siepman, P.Eng., KGS Group

After doing an extensive study of flood prone areas of the Assiniboine River and Lake Manitoba basins KGS Group went on to analyze and conceptually design scores of solutions.

Since the “Great Flood” of 1950, Manitoba has proactively developed an extensive integrated flood protection system. In spite of this commendable history of flood protection, there have been floods that have caused damages in the drainage basins of the Assiniboine River and Lake Manitoba, notably the floods of 2011 and 2014.

To address large floods in the Assiniboine and Lake Manitoba drainage basins, the Province of Manitoba retained KGS Group to carry out a study of flood mitigation. The study was complex. It covered a drainage area that exceeded 246,000 square kilometres and

extended into two other jurisdictions: the Province of Saskatchewan and the State of North Dakota.

In collaboration with Manitoba Infrastructure and Transportation, KGS Group conducted a comprehensive analysis of the interconnected flood system, including the Assiniboine, Souris and Qu’Appelle Rivers, Lakes Dauphin, Winnipegosis, Manitoba, and St. Martin, and the City of Winnipeg.

The preferred flood mitigation options that were identified during the study, which combined have an estimated cost of approximately \$1.1 billion, would significantly help

to reduce water levels and damages in future floods. Furthermore, the recommendations of the study can serve as the foundation for major flood mitigation programs on the Assiniboine and Lake Manitoba River Basins for the next several decades.

IDENTIFYING PRIORITY AREAS FOR NEW PROTECTION

Our study determined the existing flood protection levels of different locations across the study area and identified those that did not meet the applicable provincial flood protection policies. The protection level for each

“The preferred flood mitigation options that were identified during the study, which combined have an estimated cost of approximately \$1.1 billion, would significantly help to reduce water levels and damages in future floods. Furthermore, the recommendations of the study can serve as the foundation for major flood mitigation programs on the Assiniboine and Lake Manitoba River Basins for the next several decades.”

area had to exceed one or all of the following measures:

- (1) The 1:200 year event, which was adopted after the 2011 flood and was greater than the previous 1:100 year standard.
- (2) The highest flood on record, if greater than the 1:200 year event.
- (3) A greater flood event that could be justified in an economic analysis that considered costs and benefits.

The Lower Assiniboine River between Portage La Prairie and the City of Winnipeg was found to be the highest priority area as it has infrastructure that would be vulnerable at flood magnitudes much less than both the largest flood on record and the 1:200 year event.

DEVELOPING THE OPTIONS

Various options for providing more flood protection, including standalone projects and combinations of projects, were considered to increase the level of protection in areas that did not meet the provincial standard. In total we evaluated over 70 mitigation options of both non-structural strategies and structural options. They included dikes, small and large reservoirs, diversion channels, wetland restoration, development controls, and modifications to land use.

Conceptual designs and cost estimates were prepared for each of the options, followed by an assessment of benefits as well as environmental and social impacts. The assessment considered not only the flood fighting costs and the cost of flood damages and repairs, but also intangible damages such as stress and anxiety caused to local residents, property owners and people engaged in the flood event response.

LOWER ASSINIBOINE RIVER

Various schemes with different capacities were considered for the existing 150-km provincial linear

diking system on the Assiniboine River downstream, east of Portage la Prairie. When combined with upgrades to the Portage Diversion (see below) the improved dikes would provide a flood protection level of at least 1:200 years.

The cost of the most feasible option, which consisted of upgrading the existing dikes generally in their current location, was estimated at approximately \$270 million. Providing design flows of 655 m³/s, this option would mostly entail raising and flattening the dikes to achieve modern design standards and provide sufficient freeboard, as well as constructing access for long term maintenance and repairs. Downstream of the diking system, from approximately Baie St. Paul to the city of Winnipeg limits east of Headingley, a combination of individual flood proofing, neighbourhood dikes and the purchase of vulnerable properties severely affected by flooding was identified as the most feasible option, at an estimated cost of approximately 60 million.

PORTAGE DIVERSION

Expanding the Portage Diversion, a man-made channel approximately 29 kilometres long which diverts water from the Assiniboine River north into Lake Manitoba, was determined to be a leading option for reducing potential flooding in the Lower Assiniboine River region. Three concepts were considered: widening the existing channel; constructing an additional channel parallel to it, or a “retrofit.”

Based on the conceptual designs the retrofit option was identified as the preferred alternative, since it was the most economical. The concept consists of upgrading the existing channel by raising the channel dikes and its seven bridges, and expanding or reconstructing its control, drop and outlet structures. The cost of the upgrades was estimated

at approximately \$370 million. It would increase the capacity from 708 m³/s to 960 m³/s.

LAKE MANITOBA AND LAKE ST. MARTIN

An increase in the discharge capacities of Lake Manitoba and Lake St. Martin to its northeast was investigated as a way of limiting the rise in lake levels during flood conditions. Eight outlet channel options were developed for these lakes, of which two were identified as preferred options. Combined, these outlet channels would span eastward 40 to 50 kilometres from Lake Manitoba to Lake St. Martin and then from Lake St. Martin to Lake Winnipeg. They would include control structures, drop structures, and multiple bridges.

The Province of Manitoba is currently proceeding with the preliminary design of the above two outlet channels. The capacity of the Lake Manitoba outlet channel will be 212 m³/s, and that of Lake St. Martin will be 326 m³/s. The project’s estimated total cost is \$495 million.

Assiniboine River and Lake Manitoba Basins Flood Mitigation Study

Client:

Manitoba Infrastructure and Transportation – Water Management and Structures Division

Prime Consultant: KGS Group

*Patrice Leclercq, P.Eng.,
Colin Siepman, P.Eng.,
Dave MacMillan, P.Eng.,
Rick Carson, P.Eng.*

Other key players: Intergroup Consultants and Northwest Hydraulic Consultants

This article originally appeared in the June-July 2016 issue of *Canadian Consulting Engineer* magazine, page 12. Reprinted with permission. ⊕



Engineered Screw Piles are Analogous to Engineered Roof Trusses

A weekend warrior with a mitre saw and some wood could turn their backyard into low volume truss plant. They look simple enough to build.

Similarly, anyone with a welder and some random steel could transform their garage into a small scale screw pile factory. After all, its just some pipe and a bearing plate or two.

Screw piles and roof trusses are simple products in their appearance, but like an iceberg, what is visible at the surface can be deceiving. The unseen value in both screw piles and roof trusses is the engineering, controlled manufacturing and experience behind the companies offering the technologies.

Manitoba has experienced an emergence of screw pile contractors from other parts of Canada as well as some right here at home. It's really no surprise, since screw piles, in certain conditions, offer exceptional performance and value and they can be installed almost anywhere and at anytime.

Screw piles are a new technology to many Manitobans and new is often scary. However, screw piles do have a well documented history and established engineering principles. Since the first screw pile foundation in the 1830's screw piles have always been intended as an engineered solution, much like trusses.



Learn how you and your team can confidently specify screw piles without having to become overnight screw pile experts

Call Dale Plett B.Sc.Eng., Director of Customer Consultation at Postech Screw Piles at 204.793.0653 or email dale@screwpiling.ca and book a Lunch and Learn.

Ingenium Conference 2016, October 25-28, 2016 was the fifth annual Ingenium Conference. The conference was a big success. Thank you to all the staff, volunteers, and sponsors who made the event possible.

TUESDAY, OCTOBER 25

New Member Luncheon and Certificate Presentation

This luncheon, held twice a year to recognize new members and formally present them with their official license certificate, was held at the Norwood Hotel.



New Members in attendance pose for a group photo.

WEDNESDAY, OCTOBER 26

Recognition Wine and Cheese Reception

Held in the Concert Ballroom of the Fort Garry Hotel, this reception was held to honour Association Past Presidents, Life Members, Honorary Life Members, and those members receiving their Fellowship from Engineering Canada.



Concert Ballroom at the Fort Garry Hotel.



Georgia Holmes, Hon. Jon Gerrard, MLA River Heights, and Doug Holmes, P.Eng.

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Proforma Touchstone



President Lesley McFarlane, P.Eng., FEC, ends her term as President with the signing of the Scott Gavel by incoming President Lindsay Melvin, M.Sc., MBA, P.Eng., FEC, and presentation of her certificate of Presidency.



President Lindsay Melvin presents Past President Lesley McFarlane with her Past President's medal.

THURSDAY, OCTOBER 27

Professional Development Seminars

The popularity of this well-attended event speaks to its value in supporting the professional development of Association members. Multiple track sessions on Great Expectations in the Profession, in the Workplace, in the Province, in members' Personal Career, and in Technology were offered at this informative event.

Sessions included:

Great Expectations in the Profession

- Panel Discussion: Government Relations Strategic Priorities, featuring James Blatz, P.Eng., FEC, Michael Gregoire, P.Eng., FEC, Allan Silk, P.Eng., FEC, André Marchildon, Randy Herrmann P.Eng., FEC, and Moderated by C. Scott Sarna
- Accreditation, Licensing, and Specialization - Is a Bachelor's Degree Enough?, by James Graham, P.Eng.
- Culture in the engineering workplace: Ways in which our culture can shape our working style, by Marcia Friesen, P.Eng., FEC

Great Expectations in the Workplace

- Finding a Mentor/Becoming a Mentor, by Lisa Moretto

- Building a New Landscape of Safety & Health in Manitoba Workplaces - The Role of the Professional Engineer, by Jamie Hall, P. Eng., MBA
- Becoming a Leader in your Organization, by Ann Christoffersen

Great Expectations in the Province

- Manitoba's Water Management Strategy, by Avery Simundsson, EIT
- Great Expectations in Ice Engineering – An Updated Risk Management Framework for Ice Designs based on Emerging Research and Technology as a Response to Climate Change, by Chris Swallow, P. Eng.
- Manitoba vs. the World – Challenges and Success of U of M Engineering Student Competition Teams, featuring Marc Pelland, Lindsey Pike, EIT, James Harper, and Dean Jonathan Beddoes, P.Eng., hosted by Walter Czynryj, P.Eng.

Great Expectations in your Personal Career

- Cognitive Biases and Humility, by Alexander Hogeveen Rutter, P.Eng.
- Putting the P in the P. Eng.: What They Didn't Teach You at University, by Ann Christoffersen
- Being an Effective Team Player and Team Builder, by Lisa Moretto

Great Expectations in Technology

- Girder-Slab® Method of Construction in Canada, by Peter Timler, M.Sc., P.Eng.
- Advanced Digital Manufacturing, by Jared Kozub, P.Eng.
- Student Innovation in Biomedical Engineering, Satellite Design, and Sustainable Energy, featuring Matt Driedger EIT, Derek Neufeld P.Eng., and Paul White EIT, hosted by John Pacak, P.Eng.

Annual General Business Meeting

The Annual General Business Meeting is an opportunity for members to become directly involved in the business of the Association, vote on current matters, and acknowledge Councillors completing, or just beginning their terms. President Lesley McFarlane, P.Eng., ended her term and passed the gavel to incoming President Lindsay Melvin, M.Sc., MBA, P.Eng., FEC.

Congratulations to the newly elected Councillors for 2016-2018: Doug Bell, P.Geo., FGC, James Blatz, P.Eng., FEC, Jay Doering, P.Eng., FEC, Ruth Eden, P.Eng., FEC, and Janet Gauthier, P.Eng.





FRIDAY, OCTOBER 28

Awards Gala Dinner and Dance

Fine cuisine and highly enjoyable entertainment set the stage for a

first-class evening honouring member achievements and corporate contributions to the profession. 250 guests joined representatives from government and

industry for dinner followed by an evening of great entertainment and dancing with the Ron Paley Big Band. Congratulations to all 2016 nominees and award winners. ☺

2016 AGM MEMBER PROFILE

The Annual General Meeting of Engineers Geoscientists Manitoba took place at the Fort Garry Hotel, Thursday, October 27, 2016. Here is a profile of those in attendance.

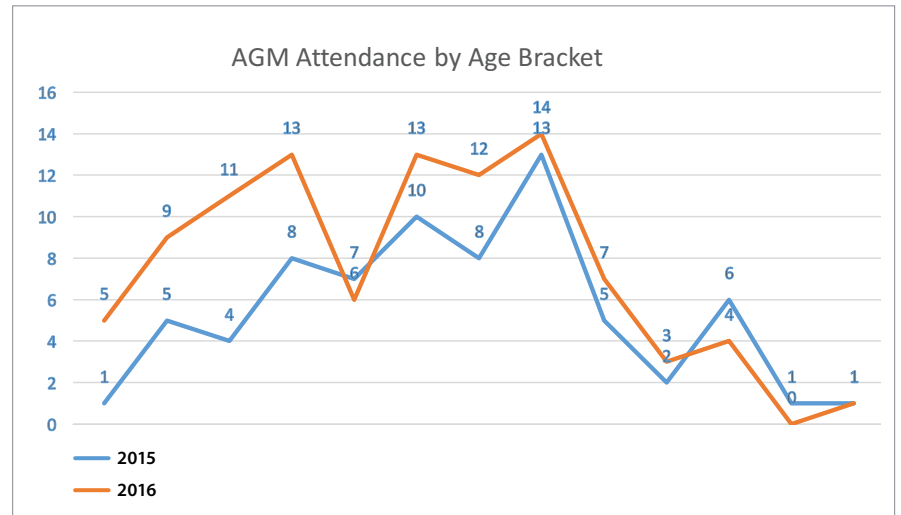
98 professional members signed-in (71 last year).

Average age:	52	56	
Youngest:	28	28	
Oldest:	87	86	
Men:	84	86%	83%
Women:	14	15%	17%
Engineers:	94	96%	92%
Geoscientists:	4	4%	8%
Practicing members:	86	88%	81%
Retired members:	12	13%	19%
Past Presidents:	16	17%	22%
Councillors:	12	13%	17%
Staff:	3	3%	4%

Some questions asked following the AGM every year are: Is this representative of the overall membership? Does the AGM format serve the needs of the membership? How can participation be increased? Is there a format which will increase the attendance across all age brackets? Send in your comments and suggestions to president@apegm.mb.ca. ☺

Distribution by Age Bracket:

	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70	71-75	76-80	81-85	86-90
2016	5	9	11	13	5	13	13	14	7	3	4	0	1
2015	1	5	4	8	7	10	8	13	5	2	6	1	1



AGM SECURITY

The Secretary decided to hire security for the Annual General Meeting held October 27, 2016. A threat was made by a member of the general public about 48 hours before the meeting was to commence. The person was demanding to attend and speak at the meeting. The person is known to police and for disrupting similar meetings. As a result, a constable was hired to be present for this potential risk. Security would not normally be hired for the AGM. ☺

INTRODUCING THE NEW PRESIDENT

BY M. DOYLE

LINDSAY MELVIN, M.Sc., MBA, P.Eng., FEC



Lindsay Melvin has been involved with Engineers Geoscientists Manitoba in a variety of roles since 2005. In fact, Lindsay was recently featured in the Spring 2016 issue of *The Keystone Professional*, in a “Meet Your Councillors” profile. Now, Lindsay is ready to take on a new role – president of the Association.

Volunteering and being a part of an Association like Engineers Geoscientists Manitoba has always been important to Lindsay. “Being involved is fantastic – it’s allowed me to learn about the professions outside of my own organization. That’s been key. Volunteering, in general, provides you with opportunities to develop skills that you may not necessarily have in your workplaces,” she explains.

Lindsay is the Head of the Distribution Portfolio Management & Controls Section at Manitoba Hydro. She earned a B.Sc. in Mechanical Engineering in 2002 and M.Sc. in Mechanical & Industrial Engineering in 2004 from the University of Manitoba, followed by an MBA a number of years later. She is a tried-and-true Winnipegger who attended Oak Park High School, in Charleswood.

Lindsay got her start at Manitoba Hydro more than 17 years ago. “I started as a summer student, in 1999. It was an excellent experience. I kept coming back

every summer during my engineering degree,” she says. Next, she went for her master’s degree with a focus on mechanical and industrial at U of M. Her master’s thesis dealt with small hydro, and was supported by a Manitoba Hydro Research & Development Grant. Lindsay then applied for the Engineer-in-Training program, and began working at Hydro full-time in 2005. Her first years there were spent in resource planning and export power marketing – focusing on the generation side of the company. Lindsay now works in distribution, which she describes as a big change, in a very different part of the business. “I love the electricity industry as a whole. It’s been a great change,” she admits.

After focusing exclusively on engineering at the beginning of her career, Lindsay went back to U of M for a Master of Business Administration in 2011. She describes the MBA as not only complimentary to engineering, but really a natural fit with how her own career was progressing. She was already doing a lot of work on teams, leading teams, and creating the engineering work that was supporting business decisions. And as Lindsay says, “it was becoming increasingly evident that having that formal training would be of assistance”. That certainly proved true for her. She found that furthering her education helped to build her confidence and exposed her to a variety of new skills, including accounting, finance, and human resources.

In her teens, Lindsay says she was drawn to engineering. “I was interested in engineering because in high school I really enjoyed math. For my career, I wanted a career that was challenging, and that was going to be *continuously* challenging. Engineering appealed because it is not only science- and math-based, but applied,” she says. What continues to keep her interested

even today is the creativity and the many opportunities and different avenues for creativity. “Continuous learning, new problems, and new ways to solve old problems that are better than the previous solutions,” she explains.

As incoming Association President, Lindsay is ready to jump in and promote initiatives that will help to balance the needs of the public and the Association members. “The need of protecting the public never goes away. We have to remain diligent at it. In terms of members, it’s engaging members in the role of self-regulation,” she explains. “I really look forward to having a great year with Council. As President, our role is to chair the Council meetings, and I’m looking forward to seeing that everyone’s voice at the table is heard. I’m looking forward to seeing some key progress and some key decisions made.”

When asked to describe what unique skills and experience she brings to this role, Lindsay says, “When people get to know me they see that I have energy and enthusiasm”. In addition, she has a great deal of experience in working with teams of volunteers and with committees, strong communication skills, team-building and consensus-building experience, and a strong interest in ensuring that all voices are heard.

One of the pressing priorities right now for Council is to set “the Ends”. Lindsay describes these as the Association’s objectives, which are currently under review. This significant task and undertaking will set direction for the Association’s staff and will be a priority over the coming year, with ongoing ramifications.

For the long term, Lindsay says evolution is key. Engineering and geoscience are evolving and need to continue to evolve. With an amazing

variety of new disciplines and new ways of working cropping up, she believes it’s important to make sure that processes such as registration are all up to par so that the association continues to evolve with these changes in the field. “We have to make sure that we understand and incorporate all this new knowledge and that it’s recognized and incorporated into our profession,” she says. Evolution is also one of the things Lindsay admits she truly likes about Engineers Geoscientists Manitoba: “We are open to evolving, and true to what we are there for – self-regulation.”

Lindsay identifies diversity as another key item. “In order to truly serve the public we need to represent the public through our own diversity,” she says. “We know diversity leads to better solutions. And that’s what we’re there for – we are there to have the best solutions for the public. In order to be the best that we can be, diversity needs to be a component.”

The future of the profession is another important issue that Lindsay is passionate about. “It’s important for engineering students and new engineers to have support all the way along through their education and their career,” she says. “I personally have benefitted from so many relationships from both men and women, from when I was a student to today, and the variety was huge – support from people within and outside the profession. That’s why I feel it is important to give back. When I give presentations, I love seeing the students and the questions I get asked. I learn what people are worried about, where things are at today.”

Lindsay feels there are a lot of open doors in engineering and geoscience. “I really believe that our professions are adaptable and we’re so good at problem-solving that we really can be incredibly welcoming professions.” ☺

MEMBER-IN-TRAINING AWARD

PRESENTED TO

STEVEN HARMS, EIT

Steven Harms graduated from the University of Manitoba in May of 2013 with a Bachelor of Science in Civil Engineering and a Master of Science in Civil Engineering in 2015. Steven became a student member of Engineers Geoscientists Manitoba in 2013 and a member-in-training in October of 2013.

As an undergraduate student, Steven worked in the geotechnical laboratory at the University of Manitoba. He also conducted research in the field of temporary flood protection for his Master's. Since graduating, Steven has been working as an EIT at TREK Geotechnical Incorporated. Steven's current role at TREK includes proposal preparation, project planning, site investigations, construction inspection, foundation design, slope stability analysis, reporting, and contract administration. He has had the opportunity to work on the design of a variety of infrastructure including bridge foundations, embankments, building additions, residential and commercial developments, erosion protection works, and slope stabilization projects.

Steven is a member of the Canadian Geotechnical Society (CGS), and sits on the executive committee as treasurer of the Manitoba Section. He regularly assists with the organization of professional development sessions and special events. He has also been actively pursuing research investment opportunities to benefit the geotechnical and geoenvironmental community in Manitoba. He has presented at professional development sessions for both the CGS and the Canadian Water Resources Association, and is also a member of the International Society for Soil Mechanics and Geotechnical Engineering.



CEO & Registrar Grant Koropatnick, P.Eng., FEC, Awards Chair Alan Aftanas, P.Eng., FEC, Steven Harms, EIT, Past President Lesley McFarlane, P.Eng., FEC and President Lindsay Melvin, P.Eng., FEC

Steven is an avid cyclist in the summer and also loves snowboarding. He is very interested in politics, and was an active volunteer for the Green Party of Manitoba in the last provincial election. For the last three years, he has presented at the General Wolfe School Career Day, which has been a lot of fun for him. He talks to the students about what engineering is, and where a career in engineering can take them.

Steven has received numerous scholarships and awards including the Neil Burgess Memorial Scholarship, Individual Report Award with the Canadian Geotechnical Society, the NSERC Industrial Postgraduate Scholarship, Lieutenant James Black Memorial Prize, and Dr. Lansdowne Book

Award. He was also on the Dean's honour list throughout his undergraduate degree.

Over the next three to five years, Steven plans to develop his understanding of geotechnical engineering by gaining hands-on experience with a multitude of different projects. He wishes to return to academia to pursue his Ph.D. once he has a robust understanding of the challenges that face geotechnical engineering and how he can work to move the profession forward. Finally, he would like to leave a professional legacy of a curious researcher, effective teacher, and able practitioner in the field of geotechnical engineering.

Engineers Geoscientists Manitoba is pleased to recognize Steven Harms as the winner of the Member-In-Training Award for 2016. ⚡

EARLY ACHIEVEMENT AWARD

PRESENTED TO

MARK LEE, P.Eng.

Mark Lee studied at University of Manitoba and obtained his B.Sc in Civil Engineering in 2005 and his M.Sc in 2010 specializing in Water Resources Engineering. During his undergraduate years Mark captured the Gold Medal in Civil Engineering for graduating with the highest standing in the program.

In addition to the Gold Medal, highlights of Mark's academic achievement include the Lieutenant James Wallace Black Memorial Prize for the best undergraduate thesis in Civil Engineering, an NSERC post graduate scholarship, a \$10,000 Prairie Adaptation Research Collaborative Graduate Scholarship for working on advanced research related to climate change impacts and adaptation in the Prairie Provinces, and one of five Canadian Water Resources Association national scholarships for programs focused on applied, natural, or social science aspects of water resources.

Mark originally started his engineering career in the consulting engineering business after graduating in 2005. He then moved on to the Province of Manitoba in 2009 as a hydrologist and earned his professional engineer status in February of 2010 along with his post graduate degree. Mark quickly gained more and more responsibility while at the Province. By the spring of 2011 Mark had taken a central role in the Province's flood fighting team including overseeing Red River Floodway operations and control of water levels in the City of Winnipeg, providing hydrological oversight of Portage Diversion operations, Lake Manitoba flooding and wind issues, and providing



CEO & Registrar Grant Koropatnick, P.Eng., FEC, Awards Chair Alan Aftanas, P.Eng., FEC, Mark Lee, P.Eng., Past President Lesley McFarlane, P.Eng., FEC and President Lindsay Melvin, P.Eng., FEC

hydrological support on many other issues. In early 2012, Mark was promoted and was given responsibility over Manitoba's million dollar hydrometric monitoring program and coordination with Water Survey of Canada. By fall of 2012, Mark was promoted to a senior engineering position as Manager of the Surface Water Management Section of Conservation and Water Stewardship.

Mark's team provides a diverse range of engineering support within the department and to other government departments, consultants and the public such as the Manitoba Drought Management Strategy which defines

the Province's direction in drought monitoring and management into the future. Mark is also the chair of the Manitoba Drought Assessment Committee and is the Canadian Co-chair of the International Red River Board's Hydrology Committee. Mark also represents the Province on a number of other important issues related to flood protection and transboundary waters including several International Joint Commission Boards and Task Forces.

Engineers Geoscientists Manitoba is pleased to recognize Mark Lee as the winner of the Early Achievement Award for 2016. ☯

CHAMPION OF ENGINEERING EDUCATION

PRESENTED TO

MARCIA FRIESEN, Ph.D., P.Eng., FEC

Marcia Friesen, Ph.D., P.Eng., FEC is the Director of the Internationally-Educated Engineers Qualification Program (IEEQ), an Associate Professor (Centre for Engineering Professional Practice and Engineering Education), and an Adjunct Professor (Electrical & Computer Engineering) at the University of Manitoba. She has developed expertise in qualifications recognition models and issues that affect internationally-educated professionals. As Director of the IEEQ Program, she is responsible to lead the team that develops and delivers this qualification recognition pathway for internationally-educated engineers. In this role, she collaborates extensively with Engineers Geoscientists Manitoba and the Office of the Manitoba Fairness Commissioner. Since 2003, through Dr. Friesen's vision and efforts, the IEEQ program has addressed academic confirmation, cultural integration, language and communication development, professional networking opportunities, and supported engineering employment of internationally educated engineers. As such, the program represents a holistic qualifications recognition approach beyond a sole focus on technical confirmation. It also represents a unique partnership between an engineering regulatory body and the university.

The IEEQ program was the first of its kind in Canada and is now nationally recognized as a comprehensive qualification recognition framework for the licensure and labour market entry of internationally-educated engineers. As an indication of the program's value and success, the Government of



CEO & Registrar Grant Koropatnick, P.Eng. FEC, Awards Chair Alan Aftanas, P.Eng., FEC, Marcia Friesen, P.Eng., FEC, Past President Lesley McFarlane, P.Eng., FEC and President Lindsay Melvin, P.Eng., FEC

Manitoba awarded it baseline funding in 2007 to become a permanent program at the University of Manitoba. In 2005, Engineers Canada engaged with IEEQ and Engineers Geoscientists Manitoba to provide information and training to other Canadian jurisdictions that were interested in developing an IEEQ-style program. All of the 180+ graduates have been registered as EITs with the Association, and to date IEEQ has contributed close to 85 new P.Eng.'s to the engineering profession as well. Whether EIT or P.Eng., approximately 90% of graduates are employed in their field, contributing to our key economic sectors in engineering consulting services, manufacturing, and the public service.

In her role as Director of the IEEQ program, Dr. Friesen has developed and teaches "Practicing Professional Engineering in Manitoba". This course is the model for a curriculum framework

called Working in Canada Seminar, made available nationally to other Canadian jurisdictions who wish to implement a similar course. Marcia regularly presents to other professions and regulatory bodies relative to issues of qualifications recognition of immigrant professionals.

With advanced degrees in both education (M.Ed.) and engineering (Ph.D.), Dr. Friesen has a diverse and interdisciplinary research portfolio. Her research focusses on the integration of internationally-educated engineers through the lenses of social and cultural capital, and identity development. She collaborates on engineering education research with others, exploring the impacts of various new curriculum initiatives on students' learning, and she has developed an independent research program in mobile health software application.

Before coming to the University of Manitoba, Dr. Friesen worked in the

private sector as a design engineer in environmental engineering and agricultural engineering consulting services. She is involved in numerous committees and task groups, including her current involvement on an APEGBC steering committee for qualifications recognition initiatives, sitting on the board of the Canadian Engineering Memorial Foundation, and on the ACEC-Manitoba TWICE committee.

For her passionate dedication to helping internationally educated engineers achieve their professional designation in Manitoba, and her tireless efforts to promote and improve the education of future engineers, the Faculty of Engineering, together with Engineers Geoscientists Manitoba, is pleased to award the 2016 Champion of Engineering Education Award to Dr. Marcia Friesen, P.Eng., FEC. ☯

NOMINATE YOUR COLLEAGUES

FOR 2017 ENGINEERS GEOSCIENTISTS MANITOBA AWARDS

Nominations for deserving Professional Engineers and Geoscientists are now open for the Engineers Geoscientists Manitoba Awards for the year 2017.

For details visit: <http://apegm.mb.ca/Awards.html>.

Please take time to complete a nomination form and forward to the Awards Committee before January 27, 2017.

Your initiative and recommendations are essential to recognize and honor deserving professionals from our membership at the next Awards Gala ceremony.



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JUDITH WEISZMANN WOMEN IN ENGINEERING CHAMPION AWARD

PRESENTED TO

DR. CHRISTINE WU, P.Eng.

Christine Wu is a professor of the Department of Mechanical Engineering at the University of Manitoba. She received her B.Sc. degree from Beijing University in China, her M.Sc. from the University of British Columbia and her Ph.D. from the University of Manitoba. She has been part of the Faculty of Engineering at the University of Manitoba since 1996.

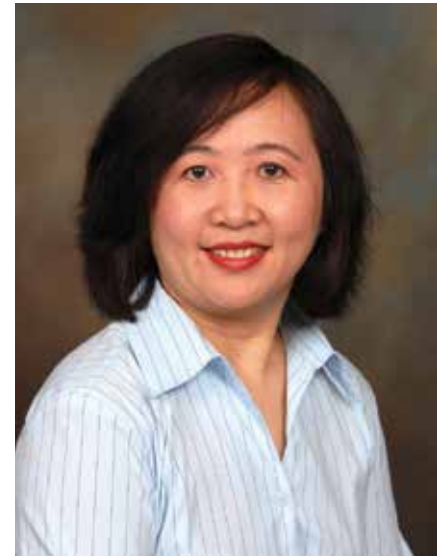
Dr. Wu's fundamental research has been applied to the engineering areas of developing bipedal walking robotics and biomechanics. She has also been in collaboration with Motor Coach Industries Inc. since 2009 and has successfully applied her theory to developing accelerated durability testing.

Dr. Wu was awarded a Senior Research Chair jointly funded by NSERC, MCI and U of M in 2013. The chair program focuses on ride safety, structural integrity and weight reduction of coach structures with the long term goal of improving fuel efficiency and reducing greenhouse gases. "Dr. Wu's expertise and scientific knowledge will allow MCI to make exceptional new breakthroughs, improving the structure and riding comfort of its motor coaches," says Mr. Jim MacDonald, the MCI executive director of engineering. Noting that improving multi-passenger vehicles presents a key opportunity to transform transportation in North American cities, NSERC's acting vice president, research partnerships programs directorate, Pamela Moss said, "Working closely with Motor Coach Industries, the work of Dr. Wu and her team will lead to safer rides for passengers on buses and similar large vehicles and will strengthen Canada's reputation as a technical innovator in this field."

Dr. Wu's research has been featured in the *Globe and Mail*, *Winnipeg Free Press*, International Innovation, MITACS, UM Research, and the Manitoba Chinese Professor Association Newsletter. Her early work was also featured and aired on CTV and Global Television. She was interviewed by CJOB radio on one of her projects related to the reduction of repetitive strain injuries. All these activities contributed to promoting university research, and raising the public awareness of the role of research in our society.

Dr. Wu is passionate about promoting and encouraging women to embark on engineering careers. She deeply believes in the power of the role model and has worked tirelessly to support women in male dominated professions. At the national and provincial levels, she organized symposia such as Women in Engineering (2014) inviting the top women leaders in industries and academia to share their insights on various issues. Dr. Wu has been involved in organizing the Manitoba Community of Women in Engineering, Science, Technology and Trades (MCWESTT) conference since 2012 and she was in charge of the conference program in 2015. Dr. Wu also developed a homepage as a part of Canadian Society for Mechanical Engineering website for Women in ME (Mechanical Engineering) with the top Canadian women professors and engineers from industries sharing their career paths and providing inspiration and advice to others.

Locally, Dr. Wu helps female students at the Faculty of Engineering by encouraging and coaching them as they enter the engineering job market. She has organized workshops including



communications, salary negotiations and networking to this end. She has also organized tours to companies and to speak to women engineers from these companies to get first-hand experience.

Dr. Wu has provided valuable service to the university, the profession and society, and has acted as a role model for women in engineering. She has actively participated in research seminars and conferences discussing issues on attracting woman engineering students and retaining them in the profession. Dr. Wu has made significant contributions in inspiring young talented women to pursue engineering careers and in their intellectual growth.

In recognition of the outstanding advancement and support of women in engineering, Engineers Geoscientists Manitoba is pleased to present the Judith Weiszmann Women in Engineering Champion Award to Dr. Christine Wu, P.Eng. ☉

OUTSTANDING SERVICE AWARD

PRESENTED TO

RAYMOND REICHELT, P.Geo., FGC

Raymond Reichelt, P.Geo., FGC, prior to being registered with Engineers Geoscientists Manitoba in 2000, was a member of the Geoscientists Grandparenting Committee from 1997 to 2000. The committee drafted the terms of reference for the admission of practicing Geologists and Geoscientists as members of the Association.

Raymond, like many professional geoscientists, has seen much of this country. Born in Nova Scotia to a military family he has lived and worked in a number of Provinces. Following his early education in Ottawa, Ontario and North Battleford, Saskatchewan he graduated with a BSc. from the University of Saskatchewan in 1979. Since then he has taken numerous work related courses to keep himself current in his profession

Following graduation Raymond worked in petroleum exploration, as well as a geologist and mudd logger with core laboratories and exploration logging. The work locations were primarily in the western Canada sedimentary basin and projects in the Beaufort Sea, on the East Coast. He also spent time in Mexico where he gained experience in describing lithology that was encountered during drilling using gas chromatographs to analyze the gasses coming of the drilling fluid and assessing the potential for dangerous drilling conditions such as blowouts.

Raymond's career focus changed in 1989 when he worked as an Environmental Consultant, working with a variety of well-known Manitoba consulting engineering companies as an Environmental Geologist/ Hydrogeologist. The work ranged from initial environmental assessment of site conditions, to site remediation, on-going



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monitoring of contaminated sites, and reclamation of sites. His present position with the Manitoba Government as the Contaminated Sites Coordinator, he is responsible for the province's multi-million dollar program for the remediation of contaminated sites in Manitoba.

Raymond is married with three children and lives in Portage la Prairie, where he is very active with the Presbyterian Church. His oldest son resides in North Battleford. Despite his busy family and work life Raymond has continued to provide volunteer service to Engineers Geoscientists Manitoba.

Following his period with the Geoscience Grandparenting Task Force where he was instrumental in setting the terms of reference for admitting Geoscientists to membership with the Association, he served on the Experience Review Committee for eight years between 1999

and 2007, assuming the Chair position for the last four years. Raymond served on the Admissions Board for three years from 2003 - 2006. In 2007, Raymond was elected as Councillor for two - two year terms, where he also sat on the sub-committees for Investigation and Registration. He served for three years as the Manitoba Representative for Geoscientists Canada and also continues to speak to groups of youth on Environmental matters, encouraging them to consider Geology as a career. He currently serves on the Keystone Professional Committee, which is responsible for producing the Association's quarterly magazine, and served on the Nominating Committee for 2016.

Engineers Geoscientists Manitoba is pleased to recognize Raymond Reichelt's continuing meritorious professional service by presenting him the 2016 Outstanding Service Award. ☀

LEADERSHIP AWARD

PRESENTED TO

KELLY HEARSON, P.Eng.

Kelly Hearson graduated with a B.Sc. (Civil Engineering) from the University of Manitoba in 1979. As an engineering student, Kelly received the University of Manitoba Gold Medal for academic achievement.

Kelly has been with the structural consulting firm of Crosier Kilgour and Partners since graduation, becoming a Partner in 1989 and President in 1996. As President, Kelly's leadership has had great effect on Crosier Kilgour, and in turn, on Winnipeg's structural landscape. He, along with the other principals of the company, took a firm of 24 people and grew it to a successful firm of 60 that provides design and consulting services in structural engineering, structural restoration, building envelope, and forensic engineering. Crosier Kilgour has become Winnipeg's largest structural engineering consulting firm, completing some of the city's most prominent structures including Manitoba Hydro Place, the MTS Centre, Winnipeg Convention Centre, Winnipeg James Armstrong Richardson International Airport and Investors Group Field.

Kelly's leadership by example has encouraged his staff to better themselves so that not only are they good technical engineers, but also genuinely care for their clients, and the work and projects that they have been entrusted with. Crosier Kilgour's company culture is a direct result of Kelly's leadership and attitude. Kelly's concern about the personal lives of each of the employees provides an environment where the staff know that they are valued; they in turn value the work that they do and are empowered to achieve their full potential in contributing to Winnipeg's built environment. In essence, Kelly's vision was to create a corporate culture



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that addressed the needs of clients and employees alike.

Kelly's involvement in a vast number of projects, over 37 years with Crosier Kilgour, has contributed to the general public's increase in trust of the engineering profession in our community. Kelly is often the first person called upon by owners looking for advice. Even when the issue is non-structural, clients know that Kelly will do whatever is required to get the appropriate help and advice that the client needs. He provides a sense of confidence to Manitoba's building owners, which has led to his reputation as a great engineer.

Kelly's commitment to helping others and leading by example extends to his personal life in the form of community involvement. He has been a long-term

volunteer for the Assiniboine Christian Centre in a variety of roles including multiple terms as a Board member. He has also volunteered with Palliative Manitoba and other organizations. Kelly has always enjoyed speaking at schools or networking events on the engineering profession.

Kelly has received the Deer Lodge Centre Foundation Leadership Award, and led Crosier Kilgour and Partners to receiving no less than 17 awards from the Association of Consulting Engineering Companies - Manitoba.

In recognition of the outstanding leadership and service to the community at large the Association of Professional Engineers and Geoscientists of Manitoba is pleased to present the Leadership Award to Kelly Hearson. ☺

TECHNICAL EXCELLENCE AWARD

PRESENTED TO

DR. JAY DOERING, P.Eng., FEC

Dr. John (Jay) Doering obtained a B.Sc. (first class honors) in Civil Engineering from Queen's University at Kingston and a doctoral degree in Coastal Hydraulics from Dalhousie University. He completed his postdoctoral studies at Environment Canada's Centre for Inland Waters in Burlington, Ontario before beginning his academic career in the Department of Civil Engineering at McMaster University. In 1993, Dr. Doering joined the University of Manitoba's Department of Civil Engineering. He became the Head of Civil Engineering in 2001, and the Dean of the Faculty of Graduate Studies in 2005. He is now serving as a member of the University's senior executive team as Associate Vice-President (Partnerships) in the Office of the Vice-President Research and International Office.

Dr. Doering has had an exemplary career of research in the field of hydraulics making significant contributions in the areas of channel hydraulics and spillway design, development of frazil ice in northern waterways, and most notably in flood protection and mitigation. Dr. Doering has been a leader in providing expertise to government and other agencies on the development of major flood protection projects including acting on the expert review panel for the Manitoba Floodway expansion and serving on several advisory boards for the Floodway Expansion Authority. Dr. Doering has also been a recognized commentator on many of the major floods, providing insights on several television and radio programs. He is the founding Director of the Acres Hydraulics Research and Testing Facility at the University of Manitoba that continues



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to provide state-of-the-art research and training of engineering students entering careers in hydraulics engineering.

During his career, Dr. Doering has received many awards for teaching, research, and service, including: teaching awards from McMaster University and the University of Manitoba, an Early Achievement Award from Engineers Geoscientists Manitoba, an Rh Institute Award for Research Excellence, a University of Manitoba Outreach Award, and a Queen Elizabeth II Diamond Jubilee Award for public service.

He is a Fellow of Engineers Canada and the Canadian Society for Civil Engineering,

and has served in executive board positions with the Canadian Society for Civil Engineering, the Canadian Water Resources Association, and the Canadian Coastal Science and Engineering Association. He has remained active in the Association where he has served as member of Council and the Awards Committee. He is currently a member of Engineers Geoscientists Manitoba's Investigation Committee.

In recognition of his outstanding leadership and scientific knowledge applied to benefit Manitobans and the nation, Engineers Geoscientists Manitoba is pleased to present the Technical Excellence Award to Dr. Jay Doering, P.Eng., FEC. ⊕

HONORARY LIFE MEMBERSHIP AWARD

PRESENTED TO

DONALD SPANGELO, P.Eng., FEC

Donald Spangelo graduated with a BSc. (Civil Engineering) from University of Manitoba in 1981. Don has been registered with the Association since 1983 and received his Fellow of Engineers Canada in 2010. Don was the recipient of Engineers Geoscientists Manitoba's Outstanding Service Award in 2003.

Don started his career in 1976 after completing a diploma in Design & Drafting Technology from RRCC. He initially worked for Wardrop Engineering as a draftsman from 1976 to 1978 and then with Dominion Bridge from 1981 to 1983 as an Engineer-in-Training. He was then employed by Crosier Kilgour & Partners as Structural Design Engineer from 1985 to 1992. During this period Don worked on numerous commercial/ industrial buildings in Western Canada including the Boeing manufacturing facility, Portage Place Shopping Centre, the Regent/McPhillips casinos, the fabric tent over the ice skating circle at The Forks and the air supported Golf Dome.

Don has been working with Manitoba Hydro since 1992. As a structural engineer he was involved in design of transmission towers and substation superstructures from 1992 to 2000. In this capacity Don coordinated the evaluation of the failure of 17 High Voltage DC BiPole transmission towers due to a wind event, which was one of the most critical structural failures for Manitoba Hydro. He presented a paper on this event at an international severe wind conference.

Don was promoted to the position of Head of the generating station



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structural section in 2000. His section is responsible for reviewing the consultant's structural design of new hydro dams (Wuskwatim and Keeyask), designs for upgrades/rehabilitation of existing dams and Dam Safety reviews and analysis. He is also a key member on the corporation's

"Engineering Drawing Best Practice Committee" which includes the evaluation of corporate engineering processes and supporting staff on engineer practice concerns. In this capacity Don has headed the development and implementation of an electronic eSealing and paperless

archiving system for engineering drawings. This system has increased the efficiency and security, and decreased the negative environmental impacts of the 30,000 plus drawings annually handled by this system.

Over the years, Don has volunteered his time to serve on Council and various committees of Engineers Geoscientists Manitoba. He was a key member of the group that pioneered the Spaghetti Bridge Building events and designed and built the specialized testing machine used to test the bridges. This popular event at the Provincial Engineering and Geoscience week and the numerous in-classroom visits he has conducted over the last 18 years introduces the concept of engineering and science to over 300 school children

a year. This involves them in designing and building bridge structures which are tested to failure. Some of his other contributions involved sitting on the task groups that developed the Continuing Professional Development program and associated ProDev Guidelines, and the Limited Licensure category of membership. He was also involved in the development of the Association's eSealing authentication process and the associated guidelines.

Don has served as a member of the Publications Committee (1983-89), member of the Legislation Committee (1989-2012; Chair 1997-2012), Chair of the Discipline Committee (1999-2008), and a member of the Continuing Competency Committee (2012-present). He has served as an elected Councillor

(1995-1997 and 2008-2014) and is presently serving on Council in an appointed position (2015-2017). Don has also been on the Advisory Committee for Structural Engineering Technology at Red River College since 2003.

Don is married to Patricia (P.Eng.) and has three adult daughters: Whitney, Lisa, and Sara. His hobby activities involve building and piloting radio controlled fixed wing and rotor aircraft, restoration of a 1954 Ford Meteor, and spending summers at his self built cottage at Victoria Beach.

In recognition of his dedicated service to the engineering profession and prolonged voluntary service to Engineers Geoscientists Manitoba, the Association is pleased to confer Honorary Life Membership on Mr. Don Spangelo, P.Eng. ☯

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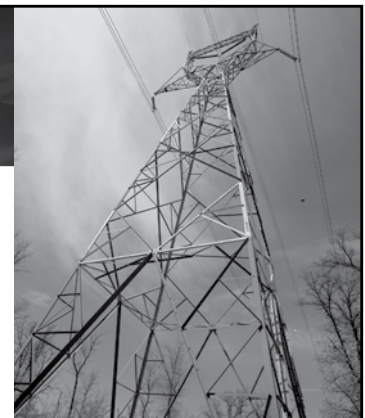
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Lithium and Tantalum and Electronics

By. R. Reichelt, P. Geo., FGC

IMPORTANCE

Some minerals are critical to our proverbial electronic village yet, because their widespread use is hidden inside our electronic devices, are unknown to the general public. One good example of this phenomenon is the use of lithium and tantalum in electronic devices.

OCCURRENCE AND USE

Lithium

Lithium (symbol Li) is produced from ores of petalite ($\text{LiAl}(\text{Si}_2\text{O}_7)_2$), lepidolite ($\text{K}(\text{Li},\text{Al})_3(\text{Al},\text{Si},\text{Rb})_4\text{O}_{10}(\text{F},\text{OH})_2$) and spodumene ($\text{LiAl}(\text{SiO}_3)_2$) as well as from lithium-rich brine deposits. Petalite, lepidolite and spodumene are commonly found in pegmatite rocks. Chilean brines and Australian pegmatites are the world's largest sources of lithium together accounting for 75% of the world's production¹.

The United States Geological Survey (USGS) estimated that worldwide annual production of lithium was 32,500 tonnes. The most common use of lithium in electronics is in lithium-ion batteries (35% of total). Other uses for lithium include ceramics and glass (35%) and; lubricating greases (32%)².

Tantalum and Niobium

Tantalum (symbol Ta) and niobium (symbol Nb; also called columbium) are commonly found together in the minerals in tantalite ($(\text{Fe}, \text{Mn})\text{Ta}_2\text{O}_6$) and columbite ($\text{Fe}_2+\text{Nb}_2\text{O}_6$). These minerals are most commonly found together in igneous rocks such as granites, pegmatites, syenites, and carbonatites³.

Tantalum is used extensively in electronics, especially in capacitors for cellphones, computers, and automotive electronics. Niobium is used in specialty steel alloys.⁴

Australia, Brazil, and Canada are the major producers of tantalum mineral concentrates; Brazil and Canada are the major producers of niobium mineral concentrate⁵. Production of niobium and tantalum as coltan in the Democratic Republic of the Congo has been controversial in that it has been associated with human rights abuses and violence⁶. The USGS estimated worldwide annual production of niobium in 2015 at 56,000 tonnes⁷ and annual production tantalum at 1,200 tonnes⁸.

MANITOBA PRODUCTION

Both tantalite (for tantalum) and spodumene (for lithium) are produced at the Tanco Mine, at Bernic Lake, east of Lac du Bonnet⁹. The minerals mined at Bernic Lake are found in pegmatite deposits.¹⁰

SUMMARY

Who knew? The operation of cell phones is dependent on a couple of critical minerals, tantalum for the capacitors and lithium for the batteries. While other materials can be substituted, with difficulty, for these two minerals, lithium and tantalum are the best materials for current technologies.

Something to think about the next time you use your cell phone.

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FEDERAL GENDER EQUITY LEGISLATION ♀

BY S.L. BARAGAR

Ontario welder, Melodie Ballard, approached her Member of Parliament (MP) after being told by her medical practitioner at four weeks pregnant that she could not return to work without risking the safety of her unborn child or herself. She had been told by her employer that they could not provide her with an alternative position that would be any safer, and was informed that her maternity benefits would not be available until eight weeks before her baby's expected due date, six months away. Canada's maternity leave benefit laws stipulate that a woman is eligible to take 15 weeks of paid maternity leave starting eight weeks prior to the birth of a child, and either parent is eligible to take 35 weeks of parental leave after a child is born or adopted. The economic safety net that employment insurance (EI) and maternity leave benefits are meant to provide, however, does not provide the flexibility to support expectant mothers forced to leave work earlier than the norm.

This is particularly concerning in light of the glacial pace society has been making toward increasing the number of women in traditionally male held STEM (science, technology, engineering, mathematics) fields. Despite years of appetite for change, gender stigma persists as a major barrier to women pursuing careers in areas such as trades, engineering, and computer science, just as it does for men pursuing careers in areas such as nursing, elementary education, and social work. Additional barriers, such as gaps in financial

support encountered only by a minority, further hinder diversification and recruitment and retention of individuals who would become part of that minority category.

Melodie's situation is not a singular incident. Quebec regulates its own maternity, paternity, parental, and adoption benefits to its residents through its Quebec Parental Insurance Plan. Quebec's parental insurance includes a 'For a Safe Maternity Experience' program to protect women from exactly what happened to Melodie. As per the program, if a pregnant woman obtains a valid certificate from her physician outlining that her work represents a danger to her pregnancy, presents the certificate to her employer as a request for reassignment and the employer is not able to provide an alternative task, the woman is eligible to receive compensation for preventative withdrawal up to the fourth week prior to her birth due date.

The rest of Canada unfortunately does not have such a program in place. As such, the MP for Melodie's riding, Mark Gerretsen, decided to sponsor a private Member's bill after hearing of Melodie's experience. Law proposals, also called 'bills', can be sponsored by a Minister as a government public bill, or they can be sponsored by a private Member of Parliament as a private Member's bill. Any legislation attempting to increase federal tax or fund spending must be overseen by a Minister. This limitation restricted the amount of change MP Gerretsen

was able to propose toward changing maternity leave laws. The drafted bill, as a result, contained two components. The first, a National Maternity Assistance Strategy Act, outlined a proposal for those in government able to make significant changes to Canada's EI maternity leave benefits, such as Ministers, to take part in consultations to do so. The second, recommended making changes to Canada's maternity leave legislation to allow a woman who is eligible, as Melodie would have been, to access her 15 weeks of maternity leave benefits up to 15 weeks prior to the date of expected birth instead of 8 weeks.

Bill C-243, as the bill was titled (the 'C' designating a House of Commons Bill as opposed to 'S' for a Senate Bill), was introduced to the House of Commons on February 26, 2016. On October 19, 2016, Bill C-243 was debated in Second Reading and on October 26, 2016, the bill was voted in favour of being referred to the Standing Committee on Human Resources, Skills and Social Development and the Status of Persons with Disabilities in the House of Commons for further consideration.

As Engineers Canada and Engineers Geoscientists Manitoba aim to increase the percentage of newly licensed engineers in Canada who are women from roughly 17% in 2015 to 30% by 2030, we should be aware of legislation trying to help increase gender equity in Canada's workforce and use it to inspire our own efforts toward accelerating one of the most important trends in the world today. ⊕

Taking the Fundamentals of Engineering Exam

By E. Clemente-Fernandez, P.Eng.

The Fundamentals of Engineering (FE) exam is the first step to becoming a professional licensed engineer in the United States. It is a computer-based exam administered year-round by the National Council of Examiners for Engineering and Surveying (NCEES). It consists of 110 multiple choice questions to be completed in five hours and 20 minutes*.

When Engineers Geoscientists Manitoba added the FE exam as a new option to verify academic qualification for applicants who have been assigned five (or fewer) confirmatory exams, it picked up great interest from students and



Maurice Petallo on a study break

new members of the Filipino Members Chapter (FMC), eliciting different reactions – excitement, worry, regret. Excitement, as this option is seemingly the most time-efficient of all the options available, needing to take and pass one exam only, with three chances of trying. Worry, as this is very new, none of the full members has any experience to share with new members. Regret, mostly for students who are already taking another option, as this would have been an easier choice. But is it?

A few have asked me about this FE exam, but unfortunately, I have very limited knowledge on this subject, since this was not yet offered during my time. So when Maurice Petallo, new chapter member, informed me that he passed the FE exam on his first try, I was more than elated as he would have the distinction of being the “first known” chapter member who have successfully done so.

And so I took the opportunity to get to know more about Maurice, or Mors, as he is fondly called, and his successful passing of the FE exam.

Mors describes himself as someone who has a serious facade, but beneath there is a funny and weird personality.

He’s a UP Diliman alumnus with a degree in Computer Engineering.

In the summer of 2015, he immigrated to Winnipeg.

When asked what made him decide to take FE instead of the other available options, he offered a lengthy explanation:

“Before I moved to Canada, I was already looking for options for academic qualifications. At the time, not having any knowledge of FE, I was leaning towards writing the confirmatory exams. However, since I know that my focus upon settling in Canada would be to get a job, taking the confirmatory exams wasn’t a straightforward choice. I was still considering the other available options, especially when I realized reviewing for IELTS, how challenging it was to study while working at the same time. My mom even commented, “*Anak, kung sumasakit na ulo mo diyan sa IELTS, paano pa yung sa engineering exam mo pagdating mo sa Canada?*”

“I found out about the FE through Claudia Shymko, Engineers Geoscientists Manitoba’s Assessment Officer. Indeed, it was very appealing to take just the one exam to gain academic qualification. It was also through her that I came to know about the existence of the FMC, so I immediately contacted then-president Angelito Apostol, whom had invited me to an upcoming chapter picnic. At the picnic, I even considered taking

the Internationally-Educated Engineers' Qualification (IEEQ) program, as I met FMC members who went into the program and were successful and getting good engineering jobs. After carefully weighing my situation and thorough review of available options, I narrowed down my choices to three options according to my preference: (1) FE, (2) Confirmatory Exams and (3) IEEQ. Eventual turn of events, however, cemented my decision to take FE. I got freelance work through a friend around October of last year, which would mean getting by on living expenses or support my living expenses. Then I got three interviews on job applications, where one offered a full-time job. In December, during FMC's Christmas party, my name was drawn as recipient of 2016 Bursary Award. All these things solidified my choice to take the FE option. What else can I ask for? When it rains, it pours."

The core of successfully passing any exam is preparation.

Mors metaphorically described his preparation as "...seeing myself going to an island without any bridge linking to it, no means to reach it, but by swimming and I have yet to learn how to swim..."

Recognizing that no member of the FMC had taken this exam yet and no review centres, he struggled to prepare for this exam. There is a live on-line review course, but it costs over a thousand dollars to access.

"Though study areas were provided, it was not enough for me to know how deep I need to go through the topics. In September 2015, I was blindly studying calculus, which I felt was still leading me nowhere, leaving me more doubtful if I was on the right track. After a few searches on-line, I came across forums, free on-line review sites and other resources about the FE exam in the US and just assumed that it might be the same. While still undecided about purchasing review books, I opted to search on-line for free lecture videos and course materials such as, among others, MIT Open courseware and Khan Academy. Again, I blindly studied whatever topic listed in the FE exam specifications for Electrical and Computer."

Mors eventually purchased textbooks and Professional Publications, Inc. (PPI) and NCEES sample exams to further aid him in his studies.

It is not uncommon for new immigrants to experience depression and homesickness – Mors is not an exception. Now that he had plenty of material to aid him in his self-study, thoughts of his parents, family, friends, and his great career back in the Philippines triggered the feelings of being alone in a new country.

Mors managed to get through. He said, "If you would like to be an engineer in Canada, a goal and discipline is what you need to have. A goal will keep you moving forward. I have to believe that after this, a better future is waiting. I prayed much harder than I'd ever prayed in my life.

The FE option is not like IEEQ where you are able to meet people regularly just to have someone to talk with. That is why I was thankful to my new found family in FMC."

With a full-time job that came in January 2016, Mors had yet to deal with another challenge. He had to be strategic and incorporate careful planning between his work and self-study schedules, not to mention he had no car at the time and had to take an almost two-hour bus ride. He said, "Now that I have a job, I have to perform well so I sometimes opted to extend an hour of work to learn more of the technology, as



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it's different from what I was doing before. I had to catch up fast and make huge adjustments."

With frequent trips to the library, multiple practice exams and repetitive readings for five months, Mors decided he was ready for the exam.

However, it took him another two months to enlist for the exam in May, as he needs to re-learn some topics from the early months of his review that had slipped from his memory. "I had to read some of the topics over and over again. As far as I can remember, I read the entire book at least three times and some of the topics I went through five times or even more. I put a lot of effort on circuit-analysis and tried to practice solving problems available for free on-line. I even answered the free diagnostic exams at least twice. I knew I wouldn't be ready without good practice even if I was already familiar with the topics."

Two weeks before his exam, as he was already getting good scores from his practice tests, Mors' confidence had greatly increased knowing that he can sit in the exam fully prepared. But still, he did not stop preparing – he continued to practice and maintain the momentum.

He recalled, "On weekends, weeks before my exam, all I did was answer test problems in front of my laptop repeatedly. Repetition is the mother of all skills."

When asked how would he describe the actual exam, he said, "It's not easy but it is also not too difficult. After all,

the name says 'fundamentals.' Maybe it is easier for recent graduates, since the concepts are still fresh in their minds, but it doesn't mean that it's not possible for someone who has been out of school for years to successfully pass the exam."

approved by Engineers Geoscientists Manitoba. Try to study first as much as you can and try to determine your phase in studying. Create a schedule and set the target date when you want to finish all the topics in the exam specification. Add at

"I slowly peeked through my hands to see the word, 'Passed!' That day, the best thing ever happened to me. I am not exaggerating. I couldn't contain my happiness."

Oh, and by the way, what's more nerve-wracking than taking the exam? The day you get the result!

"I was on lunch break, when I checked my personal e-mail and saw that my exam result was available. My heart skipped a beat and I had to drink water. I logged in to my NCEES account and as I typed my password, I covered my eyes with my left hand while my right hand held the phone. I slowly peeked through my hands to see the word, 'Passed!' That day, the best thing ever happened to me. I am not exaggerating. I couldn't contain my happiness. I went to the washroom, locked it, and I did the loudest whisper that a man can do saying, "Yes!" like 10 times. After that, I tearfully called my mom in the Philippines to break the good news."

Mors' personal advice to those considering to take the FE exam: "Do not enlist for the exam even if you're already

least one whole month of just practicing to solve. The month after that is a good time to schedule your exam date. That was my personal strategy. I simply didn't want to chase my schedule but instead, self-study at my own phase. If you schedule immediately, you might be rushing into things and if something unexpected happens along the way, you will end up taking the exam less prepared. Study and practice solving as many problems as you can. The FE exam option is already like a shortcut. Don't try to make a shortcut in a shortcut by not studying."

With perseverance, hard work, drive and focus, Mors earned his Engineer-In-Training (EIT) designation three days before celebrating his first anniversary in Winnipeg. Indeed an incredible feat that's one for the record books! ☺

*Source: *ncees.org*



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- **We updated** our name to Engineers Geoscientists Manitoba, to be easier to recall and more relevant.
- **We introduced** a new brand that captures the energy and the professionalism we bring.
- **We are increasing** our government relations; student and educational engagement and industry partnerships and dialogue.

Now, Engineers Geoscientists Manitoba is launching our first major public awareness campaign to increase the visibility and value of Engineers and Geoscientists.

GET INVOLVED

If you, or someone you know has noteworthy accomplishments in the community or you are proud of the work you do in engineering or geoscience, take a photo! **Post it on Twitter, Facebook, or Instagram and hashtag it #WorldWorksBetter** to help create excitement around the work that is happening right here in Manitoba.

Download the campaign stamp from apegm.mb.ca and use it in your photos.

Let's work together to share accomplishments, inspire the next generation, and create awareness around the little things you do every day, to make our world work better.

@EngGeoMB



Welcome New Members

J.J. Aird	P. Dionne	J.E. Innes	M.Y. Nene	B.A. Stafford
H. Akbari	Q.H. Du	B.K. Johnson	R.B. Newbury	L.A. Stewart
D.R. Alexander	M.A. Dubiel	R.K. Johnston	J. Ng	N. Su
E. Alonso	A. El Gendy	J.W.R. Kachurowski	R.M. Nicoara	F.D. Tambal
D.R.C. Amorim	E.A. El Madhoon	J.Q. Kim	D.T. Nowlan	D.J. Tara
M.J. Audet	D.H. Enns	M. Kindratsky	K.M. Oluwasegun	J.D. Taylor
A.E. Baez Rodriguez	A.B. Faliao	G.R. Kirkham	F. Ould-Ouali	P. Therrien
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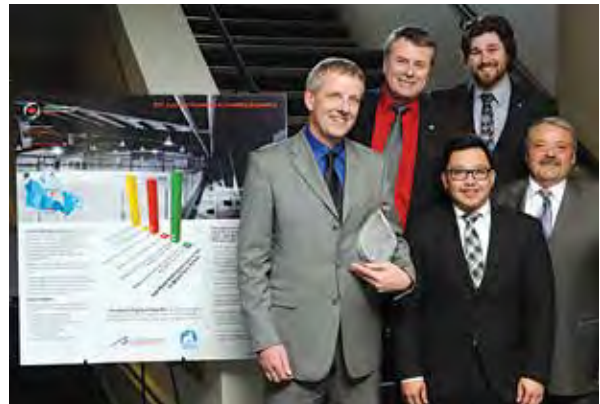
In Memoriam

Guenter Schaub Scott James Rieger

Accutech Wins a 2016 Canadian Consulting Engineering Award of Excellence

Congratulations to Association members Brent Wall, P.Eng. and Ken Drysdale, P.Eng. of Accutech Engineering on winning the 2016 Canadian Consulting Engineering Award of Excellence. The award was presented for their work in the design and implementation of a sustainable ice plant in the arena in Whale Cove, Nunavut - 1,400 kilometres north of Winnipeg. The award-winning project had to meet many goals, not only to extend the local hockey season without increasing operating expenditures, but to provide for minimal maintenance,

environmentally conscious design, low water consumption, and very low power consumption. The award is presented by the Association of Consulting Engineering Companies-Canada and the *Canadian Consulting Engineer* magazine. While these awards are presented based on innovation and complexity, Bronwen Parsons, the magazine's editor remarked that this project also had "heart" in



spades, in the sense of demonstrating a strong social and environmental consciousness. Well done, Accutech! ☕

Congratulations

Congratulations to Digvir S. Jayas, P.Eng., FEC on being recognized by the Tamil Nadu Agricultural University in India. The University conferred a doctor of science degree on Jayas at its 37th Convocation on October 15, 2016.

"I am proud of my research accomplishments at the University

of Manitoba and I owe a great deal of thanks to the many TNAU graduates and professors who chose to work with me and contributed to my success," said Jayas. "Their contributions have led to a better understanding of interactions among biotic and abiotic factors in stored-grain ecosystems through

experiments and mathematical models. These models can be used to design better grain storage systems."

To see full story please visit: <http://news.umanitoba.ca/indian-university-confers-honorary-degree-on-u-of-m-vice-president-research-and-international>. ☕



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Authorities Having Jurisdiction

A common question that comes to Engineers Geoscientists Manitoba is from practitioners who are seeking advice on how to handle their relationship with an authority having jurisdiction. An authority having jurisdiction, or AHJ, is an entity that oversees regulations concerning the public well-being. A key role played by an AHJ is to review designs and work to ensure that it complies with applicable codes and standards.

An example of an AHJ that is most commonly recognized by the public is that of a municipality who oversees compliance with the Manitoba Building Code. In this example, the AHJ issues building permits after approving the design for the building. The AHJ will also commonly inspect construction works for further assurance that the final building will meet the requirements of the Code. Other examples of AHJ include Manitoba Hydro reviewing natural gas and electrical works as well as Manitoba Conservation in their role overseeing acts such as The Environment Act.

At times, the AHJ will interface with an Engineers Geoscientists Manitoba practitioner that is providing design services to a client. For example, professional engineers designing a building will have their designs reviewed by the AHJ(s) who are responsible for the Building and Mobile Homes Act. These AHJ(s) will review the designs for compliance with the Manitoba Building Code, the Manitoba Plumbing Code, and the Manitoba Electrical Code. Occasionally, the AHJ will request a clarification or a change to a design submitted by an Engineers Geoscientists Manitoba practitioner.

These requests can be generally classified into two types. The first is one that deals with an explicit requirement of a code or standard.

An example would be a request to have the designer include a note clarifying the design load used in developing the design. This type of request may be made by a person who is not licensed with Engineers Geoscientists Manitoba.

The second type of request is one that cannot be traced back directly to an explicit requirement in the applicable code. This type of request comes from a review that requires the application of engineering or geoscientific principles. An example is a request to add structural elements for lateral stability.

Where an Engineers Geoscientists Manitoba practitioner receives a request from an AHJ to make a change to their design, they should first determine what type of request is being made. The best way to make this determination is to ask the AHJ to provide a written request and to specify the explicit code requirement upon which they're relying to request the change. As mentioned above, this type of request may come from a person who is not licensed with Engineers Geoscientists Manitoba.

Where the AHJ does not point to an explicit code requirement, the review or request must come from someone licensed with Engineers

Geoscientists Manitoba. At this point, any disagreements should be dealt with in a collegial, professional manner.

Although it can be difficult for the practitioner who took responsibility for the original design to accept changes arising from others, the importance of the input by the practitioner working on behalf of the AHJ needs to be recognized. Like the practitioner who created the initial design, the AHJ's mandate in these cases is to protect the public. The AHJ simply has a more focused lens on a specific area.

The AHJ's practitioner should therefore be considered as a member of the design team. This is very similar to the way that modern design teams bring together multiple professions and disciplines for the shared purpose of developing an end product that meets everyone's needs. This peer-to-peer professional relationship is the reason that the AHJ must rely on an Engineers Geoscientists Manitoba licensed practitioner where their review goes beyond explicit requirements. In the unfortunate cases where the dialogue between an AHJ practitioner and the applicant, there is always the option to have the issue formally reviewed by a group of peers at Engineers Geoscientists Manitoba. ⊕



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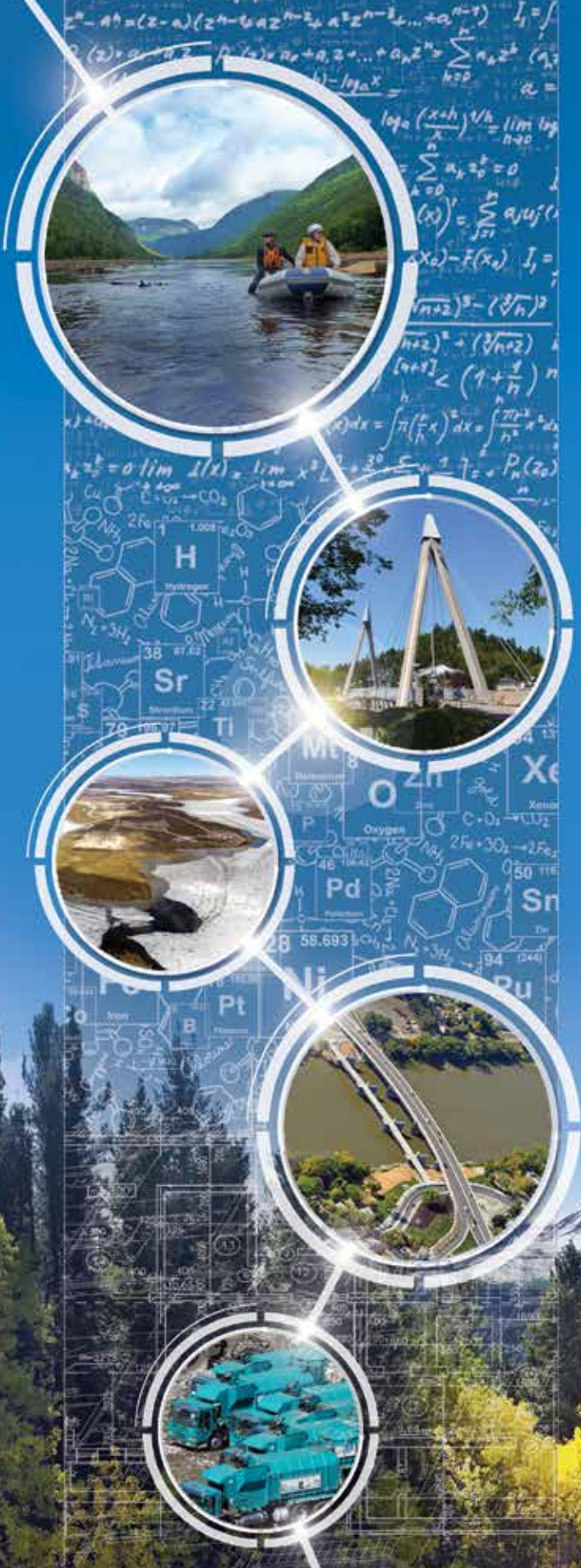
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