

THE KEYSTONE PROFESSIONAL

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

JUNE 2004
www.apegm.mb.ca

APEGM Members Receive Awards

Jim Graham, P.Eng., Ph.D., Receives John B. Stirling Medal

*Adapted from the Official Citation
of the Engineering Institute of
Canada*

The Engineering Institute of Canada recently awarded the John B. Stirling Medal to James Graham, P.Eng., Ph.D.

The Medal is awarded by the Council of the Institute in recognition of leadership and distinguished service at the national level within the Institute and/or its Member Societies.



James Graham, P.Eng., Ph.D.

Dr. Graham received his Bachelor's degree in Civil Engineering from Queen's University in Belfast. He subsequently completed a Ph.D. in Soil Mechanics and a Doctor of Science in Geotechnical Engineering. He has had a stellar teaching career at a number of highly-respected institutions around the world, including his Alma Mater, Queen's University, the Norwegian Geotechnical Institute, the Royal Military College (Kingston), Oxford University (UK), The University of

Queensland (Brisbane), and the Nanyang Technical Institute (Singapore). He is currently a professor at the University of Manitoba, where he has taught for almost three decades when not being shared by other institutes, universities, and engineering companies. Dr. Graham is a very well-traveled, busy, and highly-respected Professor and Research Engineer. For such work he has won a number of awards including the Hill Sanderson Award for teaching, the CCPE Medal for Distinction, and the prestigious Legget Medal of the Canadian Geotechnical Society (CGS).

He is currently Director General of the CGS, where his work involves guiding the programs of a very active and diversified technical society with almost 1300 members in Canada and overseas. In earlier days Dr. Graham was Editor of the Journal of this society, where he broadened its area of interest into environmental geotechnology, geohydrology, rock engineering, and geostatics. Following a period as Vice-President he became President of CGS, where he pursued a policy of "participation, rejuvenation, education, and communication." The program was aimed at increasing the involvement of students and young engineers, and included student competitions for best theses and papers. Special conferences for such developing talent have grown directly from his efforts. The CGS, the EIC, and Canada are fortunate to have the interests of such a person directed at the upcoming generation.

Currently, as Director General, Dr. Graham coordinates the linkages of the CGS with all the major international societies in the fields of soil mechanics, rock mechanics, engineering geology, geosynthetics, permafrost, and hydrogeology, in

addition to managing and promoting three to four national and international conferences that result from these initiatives.

The Medal was awarded to Dr. Graham during National Engineering Week in March 2004.



Dr. Christine Kaszycki Receives PDAC Environmental Award

By: G.M. Ostry, P.Eng., P.Geo.

Each year The Prospectors and Developers Association of Canada recognizes excellence and achievement in the minerals industry at its annual convention in Toronto. On March 8, 2004, at the Fairmont Royal York Hotel in Toronto, Dr. Christine Kaszycki, P. Geo., Assistant Deputy Minister in the Manitoba Department of Industry, Economic Development and Mines, was honoured with one of two Environmental Awards in recognition of her work and achievements as Chair of the National Orphaned/Abandoned Mines Initiative (NOAMI). The Prospectors and Developers Association of Canada recognized that Dr. Kaszycki has worked tirelessly and wisely to spearhead, manage, and promote this important environmental program.

Orphaned or abandoned mines are those mines for which an owner cannot be found or whose owner cannot or will not carry out the work necessary to remediate an old mine site. In 2001, federal, provincial, and territorial Mines ministers asked that a national multi-stakeholder Orphaned/Abandoned Mines Advisory Committee be formed to study various issues and initiatives concerning the development and implementation of orphaned and abandoned mine site remediation



Dr. Kaszycki being presented with her award by incoming PDAC President Peter Dimmel

programs across Canada. The National Orphaned/Abandoned Mines Advisory Committee was struck in March 2002 with Dr. Kaszycki as Chair. For further information on the National Orphaned/Abandoned Mines Initiative, please visit the NOAMI web site at www.abandoned-mines.org.



R.M. Godse Elected Fellow of The Institution of Structural Engineers

By: P.H. Boge, P.Eng.

Winnipeg's R. M. (Ram) Godse, M.Sc.(Eng.), C. Eng., P.Eng., President of R.M. Godse & Associates Ltd., Consulting Structural Engineers, has been elected Fellow of The Institution of Structural Engineers, London, U.K. The I. Struct. E. designation is recognized worldwide in the field of structural engineering.

"The criteria for being elected to the Institution includes experience, published papers, and innovative

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850A Pembina Highway, Winnipeg, Manitoba R3M 2M7

Ph. (204) 474-2736 Fax (204) 474-5960

E-Mail: apegm@apegm.mb.ca

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

Although the information contained in this publication is believed to be correct, no representation or warranty, expressed or implied, is made as to its accuracy and completeness. Opinions expressed are not necessarily those held by the APEGM or the APEGM Council.

New Members Registered March and April 2004

A. Anand	K.L. Gompf	B.J. Miller	S. Shaukat
G.B. Bahar (ON)	N.S. Gonzalez	M. Mitchell (BC)	D.T. Shimizu
N.J. Banton	J.R.R. Hudson (ON)	J.S. Moritz (ON)	J.A. Skeet (AB)
G.R. Brooks (ON)	J.V. Joaquin	M.P. Morris	R.S. Smyrski
P.T. Carroll	A.G. Kirouac	J.P. Pelletier	G.W. Thorpe (BC)
D.A. Clark (ON)	D.C. Krokosz	P.F. Rasmussen	J.C. Waddell
D.V. Faulkner	J. Kulchisky (AB)	R.W. Reidy	M.W. Wickham (ON)
K.P. Fitzpatrick	J. McInerney (AB)	B.W. Rydberg	G.H. Yogendran

Licenses Issued March and April 2004

A.P. Henderson (CA)	D.M. Honan (NY)	M.K. Sjoblom (MN)
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Members-In-Training Enrolled March and April 2004

R.P. Aiello	G.P. Jaman	F.B.J. Mei	J. Sondergaard
E. Au	B.E. Johnson	J. Peng	H. Su
K.E. Baxter	K. Kiselbach	S. Penner	B. Trachenko
R.T. Billingham	K.S. Ling	S.D. Philipoulos	K.W. Unger
H.S. Diocee	L.S. Lukic	A.R. Raichura	G.M. Zajac
M.R. Doucet	G.G. Martel	C.M. Rennie	Z. Zhou
J.P. Hayes	I.R. McCallister	A.W. Schnerch	

Members Deregistered April 1, 2004

P.I.S. Bains	S. Dedhar	S.E. Hage	H.M.B. O'Connor
D.A. Barrett	N.R. Dickey	R.P.S. Han	S.J. O'Loughlin
A. Beaudet	A.P. Frey	P.A. Ingram	J.L. Petersen
B.J. Bell	A.A. Galea	L.D. Llewellyn	J.H. Reid
J.D. Buchko	S. Giguere	A.F. Ma	R.S. Solmundson
T.M. Carey	T.N. Giorio	N. Maksymiw	H.C. Suan
G.S.C. Cherkas	L.M. Glantz	B.A. McFerran	B.L. Townes
L.T. Court	N.E. Groening	S.C. Mukul	K.B. Watson

Members-in-Training Removed from Enrollment April 1, 2004

J. Cadloff	P.A. Gomori	L.I. Potter	A.A. Sayyah
B.J. Denny	J. Harris	M.L. Rahman	C.S. Silverman
E.R. Ducharme	M.L. Henderson	S.M. Ramnath	M.J.J. Stadler
M.A. Flinta	M.L. Jacobson	M.L.B. Riediger	J.W. Ward
N.W. Fossheim	M.A. Kolinski	R. Roller	
K.A.M. Geske	M.L. Maxwell	R. Sarauskas	

Members-in-Training Resignations March and April 2004

K.W. Bannister	J. Fehr	K.W. Pilling	D.T. Wiebe
S.M. Burland	R. Kaminski	T.J. Ramnath	L.G. Wytrykush
T.D. Dolyniuk	W.R. Novotny	J.J. Szot	
D. Federkevich	E.J. Olson	K.M. Tiede	

Retirements as of January 1, 2004

D.E.M. Allen	I.T. Hosain	A.F. McLellan	R.M. Stefanick
K.A. Buhr	E.L. Johnston	D.A. Menzies	A.G. Stephen
W.D. Burbank	W.A. Kassian	E.R. Miller	D.A. (Dean Anthony) Stewart
W.H. Campbell	E.H. Klassen	W.E. Muir	B.G. Thiessen
G.A. Collis	K.T. Kotyk	S. Onyshko	W. Tibelius
C.W. Dubeau	J.E. Kowalski	D.G. Osman	B.G. Trenholm
N. Fedorchuk	E.R. Levick	R. Petri	A. Tsisserev
J.C. Greenhill	R.J. Linton	W.S.J. Reinisch	D.W. Zelt
A.J. Griezic	C.D. MacLeod	D.S.J. Render	
W.C. Harrison	B.R. Manning	S.P. Seniuk	
C.W. Hasselfield	H.E. Martel	M.J. Sichler	
M.A. Holmberg	R.E. McCallum	G.S. Smith	





Executive Director's Message

D.A. Ennis, P.Eng.

Mobility of Professional Engineers

There were two important developments related to the mobility of professional engineers at the recent Annual Meeting of the Canadian Council of Professional Engineers. The first development was that the Inter-Association Mobility Agreement between the provinces, first signed in 1999 for a five year term, was renewed. The renewed agreement provides that it will automatically be renewed again in 2009 unless there is a reason for it to be reviewed or revised.

The second development was the signing of a mutual recognition agreement between the engineering associations/ordre of Canada and the Hong Kong Institution of Engineers. This is the second international agreement at the licensure level, the first being with Mexico under the NAFTA. Other than Texas, the state boards of registration in the USA are not yet signatories to the Mutual Recognition Document under NAFTA.

It is worth noting that Manitoba professional engineers who obtain licensure under any of these agreements will be required to comply with the applicable continuing competence/continuing professional development requirements of the host jurisdiction.

City of Winnipeg Building Permits

APEGM has been a participant in the Industry Advisory Group established by The City of Winnipeg to consult with its Planning, Property and Development Department in the development of an enhanced building permit delivery system. The new system, "Permits

X-Press", was launched in April. Members can learn more about the system through the City's website. One of the issues that is under discussion is the extent of the plan examination to be undertaken by the Department before issuing a permit. The issue of plan examination leads to the responsibility of professional engineers to undergo building code education and the recent legislation in Ontario under which both design professionals and building officials will be required to take examinations to become certified as being building code qualified. An added requirement in Ontario is that design professionals, in addition to being certified will also be required to carry professional liability insurance with a minimum coverage of one million dollars.

Limitations Act

Earlier messages have reported on an initiative to pursue amendments to *The Limitations Act* to ensure that it provides balance between the rights of consumers to have a reasonable opportunity to bring an action and the rights of professionals to be protected from unfair or stale claims, and to treat design professionals and those in the construction industry fairly as compared with other professions. Current indications are that changes are not in the offing, as the Minister of Justice has indicated that, "A review of *The Limitations Act* is not contemplated at this time."

Written observations or comments, preferably by e-mail to apegm@apegm.mb.ca, on any of the topics raised in this article are welcomed. ■

Putting the Engineering into Fall Protection

By: A.A. Poulin, P.Eng.

Are you required to design Fall Protection Systems? Are you searching for guidelines and clarification on engineering requirements? CSA has just published a standard that is leading edge and will assist you in this developing area of engineering.

Fall Protection Systems are defined as: any secondary system that prevents workers from falling or, if a fall occurs, arrests the fall. Examples include guardrail, travel-restraint, safety net, and fall-arrest systems.

For those who may have been involved in helping solve some of these dangerous situations for workers, you are very aware of how little guidance there really is on this type of engineering. Fall Protection may consist of traditional methods such as handrails and safety nets, for which there is little confusion – unless of course they become an attachment point or part of a tie-off system intended to stop (arrest) a fall. Up until now, very little guidance has been available for the "Fall Arrest" component and their attachment systems that must support and arrest the dynamic loading of a falling body, considering swing fall and shock absorption, so that a worker's fall is arrested safely. A fall arrest system is defined as "an assembly of components that will arrest a worker's fall when properly assembled and used together and when connected to a suitable anchorage." This can consist of an anchor point and the assembly connecting to it, an assembly tie-off to some other structural component, horizontal and vertical life-lines, etc.

It surprised me to find out that without any type of energy absorbing device, a falling body could be subjected to upwards of 5000 lbs

impact force. Furthermore, tests have shown that the human body can only withstand somewhere around 1800 lbs impact force before suffering permanent, if not fatal, injuries. Yet, provincial legislation in Manitoba requires an anchor point to be designed for something way beyond that, 4000 lbs. Most personal fall protection equipment requires a worker to have a "shock absorbing device" as part of that system, which limits the shock

force the worker is subjected to.

However, there has been no provision to consider the shock absorption or swing falling dynamics in the design of the attachment system until now.

Several worldwide experts in the developing field of Fall

Protection are members of the CSA

"Technical Committee on Fall Protection"

(TCFP). Members of this committee were the driving force behind the

development of a CSA standard on the design of "active" fall protection systems – those systems that are not the passive, traditional methods that prevent a fall from happening. There are many work locations where traditional methods are either impractical or even impossible. This is where it is necessary to arrest a fall already in motion. An active fall protection system is defined in the standard as: "a means of providing fall protection that requires workers to take specific actions, including wearing personal fall protection equipment and following prescribed procedures."

While working on fall protection solutions for workers at Manitoba Hydro, I had the pleasure of meeting and working with several of these experts. Greg Small, formerly of Gravitec Systems (a fall protection engineering consultant) was

Continued on page 10

In Memoriam

The Association has received, with deep regret, notification of the death of the following member: E.P. Debusschere

Engineers of Tomorrow – Manitoba Schools Science Symposium (MSSS)

By: R.L. Taylor, P.Eng.

Enthusiastic grade four to twelve students filled the University of Winnipeg Duckworth Centre with 500 science projects, making the selection of candidates for the APEGM awards no easy task. For the fifteenth year in a row, the APEGM Public Awareness Committee coordinated 12 APEGM members, including myself, to volunteer the evening of 23 April and the morning of 24 April to judge engineering- and technology-related science projects.

The following outstanding contributions were selected for the APEGM awards:

\$300 Cash Awards

- Matt Haydey of the University of Winnipeg Collegiate, grade 10, "OTL 6NIP Output Headphones"
- Paul Reichart of Kildonan East Collegiate, grade 11, "Artificial Intelligence"

APEGM Members Receive Awards

Continued from page 1

design," says Godse who has provided design services on numerous projects throughout Canada. "I was the first person to bring HSS (Hollow Structural Sections) to Canada," Godse says, referring to his structural design of Canad Inns Stadium (formerly known as the Winnipeg Stadium). Godse's expe-



Newly elected Fellow of The Institution of Structural Engineers, Ram Godse, M.Sc.(Eng.), C. Eng., P.Eng.

Mini-University "Technology Plus" Scholarships

- Jacqueline Leung of St. Mary's Academy, grade 5, "LED – Future Lighting Technology"
- Nirusan Jayaranjan of Stevenson-Britannia School, grade 5, "Intelligent Robots of Tomorrow"
- Connor Fry Sykora of Ecole Robert H. Smith, grade 6, "La Puissance des Triangles"
- Andrew Moore of Whyte Ridge, grade 4, "Tumbling Towers"
- Ashley Marquart and Cassandra Behma-Chaikosky of Robertson, grade 6, "Air Pressure – Thrust"

Local engineering companies also provided their support to aspiring engineers of tomorrow. "Special Engineering" job shadowing opportunities and cash awards were provided by: Borland Construction

ience includes the Medical Arts Building, Health Sciences Centre, and the House of York, various schools and apartment buildings, as well as permafrost foundation designs in the NWT. Noted for his innovative designs, he has worked in all aspects of structural engineering.

He has also provided structural engineering services in India, England, Germany, and the United States.

Godse grew up in India. "When I was in grade 12 we as students asked the question, 'What does the country need?' There was a need for medicine and engineering and I chose structural engineering." He later moved to Canada and earned a Master's degree in structural engineering from the University of Ottawa in 1970.

Godse is registered in Manitoba, Ontario, Saskatchewan, Alberta, and British Columbia. He is the winner of the Saskatchewan Premier's Award of Excellence in Design. He has written numerous technical papers and is the representative of The I. Struct. E. for Manitoba. ■

Inc., Crosier Kilgour & Partners Ltd., Dillon Consulting Limited, Earth Tech Inc., FWS Construction, KGS Group, Manitoba Hydro, MicroPilot, Nelson River Construction Inc., Oldfield Kirby Esau Inc., Teshmont Consultants LP, Transcontinental, and Vector Construction Group.

The APEGM judges selected the following projects for the "special engineering" awards:

- Nirusan Jayaranjan of Stevenson-Britannia School, grade 5, "Intelligent Robots of Tomorrow"
- Udeesha Annakkage and Malsha Annakkage of Acadia Junior High, grade 8, "Vision Impaired"
- Nishant Balakrishnan of Acadia Junior High, grade 8, "Creepy Crawler Robots"
- Timothy Siow of Linden Christian, grade 5, "Gears and Weights"
- Dane Pischke of Acadia Junior High, grade 8, "Flammability"
- Theo Ionescu of River Heights, grade 8, "Flexible Foundation"
- Patrick West and Tyler Routledge of Acadia Junior High, grade 8, "A Hide & Seek Horror Story"
- Don McKenzie of St. John's Ravenscourt, grade 9, "Wave Power"

- Paul Reichart of Kildonan East Collegiate, grade 11, "Artificial Intelligence"
- Andrew Moore of Whyte Ridge, grade 4, "Tumbling Towers"
- Janelle Van Den Bosc and Ellen Whitmore of Viscount Alexander, grade 9, "Pour Corroder ou de na Pas Corroder"
- Coleen Hadasyk of St. Mary's, grade 7, "Rock Proof Your Windshield"
- Jacqueline Leung of St. Mary's, grade 5, "LED – Future Lighting Technology"
- Riley Storozuk and Dale Morrison of Henry Giza, grade 5, "Strong & Stronger"

On behalf of the Public Awareness Committee, I would like to thank Robin Hutchinson, APEGM Council, for presenting the awards to the exceptional students named above at the awards ceremony. A big thank you also to all of our volunteer judges for their hard work: Alison Fraser, Michael Gregoire, Devang Joshi, Duane Joyce, Ginette Kowerko, Dan Mages, Taran Peters, Kurt Shaw, Hansong Su, Kevin Sydor, Rui Yang, and Mahmoud Zandi. ■

News Release

The Canadian Council of Professional Engineers (CCPE) honoured a select group of Canada's top engineers at the 2004 Canadian Engineers' Awards gala on May 15, 2004.

Presented annually since 1972, the Canadian Engineers' Awards recognize outstanding engineering excellence and achievement. This year's award recipients included seven remarkable professional engineers who have devised innovative engineering solutions; a highly motivated engineering student who has contributed to humanitarian efforts; and an engineering project which has improved the quality of life of a major Canadian city.

"I am extremely pleased to honour the 2004 award recipients," says Marie Lemay, P.Eng., Chief Executive Officer of CCPE. "These individuals have truly raised the bar of engineering excellence in Canada. Their outstanding contributions have had a positive impact on the community, the environment, and the overall safety and well-being of Canadians."

Dr. Jeannette Montufar, P.Eng. received the Young Engineer Achievement Award for her significant contribution to many high profile transportation engineering projects, including the development of Manitoba's Intelligent Transportation System strategic plan, and a study on roadway safety benchmarks over time, used by the federal government to improve road safety in Canada. ■

Complying with PIPEDA – Why and How!

By: D. Carrick

Effective as of January 1, 2004, all organizations in Canada that collect, use, or disclose personal information in the course of a commercial activity must comply with the *Personal Information Protection and Electronic Documents Act* (Canada) (referred to in this article as "PIPEDA").

Because of the very broad definition of "organization" in PIPEDA, all engineering or geoscience firms must comply with PIPEDA, regardless of their business structure – i.e. sole proprietorship, partnership, or corporation.

Before discussing what an engineering or geoscience firm needs to do to comply with PIPEDA, it is important to keep in mind the following:

1. "Personal Information" is broadly defined in PIPEDA to include any information, either recorded or unrecorded, about an identifiable individual. The only exception is the name, title, business address, and telephone number of an employee of an organiza-

tion. As a result, information that engineering or geoscience firms have about corporate clients is not encompassed by PIPEDA, unless that information relates to an identifiable individual (for example, the personal guarantor of a project with a corporate client).

2. "Commercial Activity" is also broadly defined to mean any transaction, act, or conduct, or any regular course of conduct that is of a commercial character.
3. For constitutional reasons, PIPEDA only applies to employees of federal works, undertakings, or businesses (for example, banks, telecommunication companies, etc.). As a result, PIPEDA will not apply to the employees of most engineering or geoscience firms. However, employees of engineering or geoscience firms that carry on business in Alberta, British Columbia and/or Quebec are covered by provincial private sector privacy legislation.
4. Failure to comply with PIPEDA

could result in an investigation by the Office of the Privacy Commissioner in Ottawa. Depending upon the findings of that investigation, either the Privacy Commissioner or the individual who filed the complaint with the Privacy Commissioner alleging non-compliance can refer the matter to the Federal Court for further review. Remedies available to the Federal Court include ordering an organization to correct its personal information management practices and awarding damages to the complainant. In addition, any organization or individual who breaches certain provisions of PIPEDA or who obstructs the Privacy Commissioner in the investigation of a complaint could be liable to a fine of up to \$100,000. Finally, a serious breach of PIPEDA is almost certainly going to be publicized in at least the local media and potentially also national media. An organization could experi-

ence significant negative financial repercussions if it is the subject of such a news story. As a result, for a variety of reasons, PIPEDA compliance must be taken seriously.

Against this background, what should an engineering or geoscience firm do to comply with PIPEDA?

1. Obtain a copy of Schedule 1 to PIPEDA, which sets out the 10 Privacy Principles adopted by the Canadian Standards Association in 1996 and that must be complied with in any organization's Privacy Project. A copy of PIPEDA, including Schedule 1, may be downloaded by visiting the web site of the Office of the Privacy Commissioner of Canada at www.privcom.gc.ca.
2. Appoint the individual who will be the Privacy Officer for the engineering or geoscience firm. Pursuant to PIPEDA, every organization must have a Privacy Officer who is ultimately accountable for that organization's compliance with PIPEDA. Fortunately, the Privacy Officer can delegate many of the tasks

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by Alan Jeffrey, \$61.95

The updated Handbook is an essential reference for researchers and students in applied mathematics, engineering and physics. It provides quick access to important formulas, relations and methods from algebra, trigonometric and exponential functions, plus more.



The Firmware Handbook

by Jack Ganssle, \$82.50

This handbook provides a comprehensive reference for firmware developers looking to increase their skills and productivity. This is an in-depth, one volume reference that addresses all the major issues in firmware design and development, including the pertinent hardware issues.



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Billionaire Funds Global Warming Research

U of M prof part of a hand-picked team studying climate change

Winnipeg Free Press, September 16, 2003 (reprinted with permission)

By: Nick Martin

It's like something out of a movie – a billionaire flies a group of hand-picked scientists to his vast estate to stave off a possible global catastrophe.

University of Manitoba geology Prof. Jim Teller is living through that movie.

Thursday, Teller will join an expedition to the Mackenzie River valley in search of answers to global warming's impact on climate change, an expedition funded by Wisconsin billionaire Gary Comer.

The 75-year-old Comer sold his Lands' End clothing chain to Sears for \$1.9 billion US, then took up the cause of trying to figure out what to do about global warming.

"He concluded there was reason to look at the past, recent geological history, to understand where we're



going," Teller explained. "Gary's trying to be a catalyst to bring people together."

Teller has done extensive research on Lake Agassiz – the vast inland sea which once covered much of Manitoba and northwest

Ontario – and particularly a cataclysmic episode at the end of the ice age about 10,000 years ago, when Teller believes Lake Agassiz broke through melting ice walls and unleashed a torrent of fresh water through the Great Lakes and into the Atlantic Ocean.

That torrent changed ocean currents and significantly affected air temperatures, plunging Europe into 1,000 years of cold, Teller believes.

Comer has already flown his team of scientists out of Thunder Bay to study the record left behind of the impact of Lake Agassiz.

Thursday's trip is "the second expedition to look at the other end of the Lake Agassiz basin," Teller explained. "It drained also to the Mackenzie River valley, which is where we're going this week."

When Teller first met Comer,

Teller was flown by private plane from Madison, Wisc., to Comer's vast estate, where the main house alone covered 28,000 square feet. Comer's private runway came within 25 meters of the home's front door.

"Under his house, he has two airplane hangars. He has three full-time pilots," marveled Teller.

Teller got involved through Columbia University oceanography Prof. Wally Broecker.

"He (Broecker) really likes to challenge current thinking, the kind of person science needs to have," said Teller.

Broecker wanted to hear Teller's theories about Lake Agassiz, and that eventually brought Teller into Comer's group.

Teller said that there is no modern equivalent of Lake Agassiz in built-up areas waiting to happen, but, "We've got a lot of fresh water sitting around in Antarctica and Greenland" that could be affected by global warming and produce the same impact on the ocean as did Lake Agassiz.

Comer believes that knowing how Lake Agassiz affected climate change in Europe could give us a head's up on where the world is going, Teller said.

Teller said the torrent from Lake Agassiz through the Great Lakes and on to the ocean would have been enormous. He's found evidence elsewhere in the world of sudden flows of huge amounts of fresh water to the sea, such as in the sand dunes of the Middle East, where he's found traces of marine organisms common to the Persian Gulf. ■

Engineers in the News

Edward Speers, P.Eng., Inducted Into Russian Academy

By: E.A. Speers, P.Eng., Ph.D.

I have, over the last 12 years, been making one or two trips a year to Russia, attending conferences, giving papers or a workshop, largely in Moscow or Arkhangelsk near the Arctic Circle. The country is very similar to Canada. The people are friendly and readily make a person feel welcome. The people with whom I have been working are largely professional engineers, geoscientists, petroleum engineers, mining personnel, and businessmen.

This year I was invited to Russia to meet with entrepreneurs for discussions on financial planning. Professor Oleg V. Lee, Vice President (Economics), Academy for Problems of Defence, Security, Law & Order was my host.

During the four working days that I was in Moscow I met with over 25 persons, reviewing their

projects and advising on how to proceed with a Business Plan acceptable to western banking interests, or whether they should seek government/university assistance in furthering their plans. Many large and small projects were reviewed and discussed.

At the end of the week, to my surprise, I was inducted with others into the Academy of Problems of Defence, Security, Law & Order. The reason given for this honour being, "for work you have undertaken in Russia, for what you are doing (as above), and what you will be doing..." when the business plans start coming in.

Of course, being Russian, there was a banquet with toasts of vodka and several after-parties with refreshments. It was another very memorable evening to add to my memories of Russian hospitality. ■

Climate Change Impact and Adaptation

By: CCPE

CCPE's Climate Change Impact and Adaptation Secretariat is implementing a national action plan endorsed by the 12 associations/ordre that includes increasing knowledge and awareness among the engineering community, scientists, students, government, and the general public. The CCPE is creating a Speakers Bureau as well as a knowledge base and clearing-house for information on the basic science of climate change impact, best practices, and engineering applications.

Please contact David Lapp, P.Eng., Manager, Professional Practice at CCPE: 613-232-2474, extension 240, or david.lapp@ccpe.ca if you wish to send information or volunteer to speak on current and best practices or any research, development, or pilot projects that demonstrate engineering applications adapting to climate change. Let's raise the awareness of our profession, governments, and the public on this very important issue. Adaptation to climate change is our job – let's show real leadership! ■

Consequential Damages

Why contractual exclusion clauses aren't foolproof

By: W.J. Kenny and E. Jane Sidnell, Miller Thomson LLP

"There have been various cases on this subject, and in one a man was going to be married, and his horse cast a shoe, and the smith having injured the horse in putting it on, the man was late, and the lady refused to marry him; and it was held that the smith was liable for the damages resulting from the loss of the marriage..."¹

This quotation from a British Columbia court back in June 2, 1868 raises a number of questions, but the only one that this article will deal with is: What are consequential damages?

If your office were to burn down, there would be direct damages in relation to the loss of the building and the contents, but there would also be losses because temporarily the business would not be operating. In addition, you would probably incur ongoing overhead costs such as salaries, professional fees, and office expenses even while the business is suspended.

Liability for such indirect losses is frequently excluded in contracts in the construction and engineering fields. If you are the party who cannot claim such consequential damages, you may be out-of-pocket a considerable sum that cannot be recovered. On the other hand, if you are the party benefiting from a clause that excludes consequential damages, you are obtaining a potentially huge protection from loss.

Consider the situation where a gas plant is destroyed by fire due to a design error. If the contract excludes consequential damages, then the person who made the design error may be liable for the loss of the plant. But is that person protected from a claim for the owner's loss of production from the gas plant while it is being reconstructed? Who bears the loss relating to the owner's overhead during that reconstruction period? What if the owner has further losses because it can no longer fulfil contracts for the supply of gas? Who bears that loss?

In 1997, the Alberta Court of Appeal court considered the following exclusion clause in a case relating to consequential damages, known as *Syncrude Canada Ltd. v. Babcock & Wilcox Canada Ltd.*:

"49 Consequential Damages: the Subcontractor will not be liable in any event for loss of anticipated

profits, loss by reason of plant shut-down, non-operation or increased expense of operation of other equipment, or other consequential loss or damage of any nature arising from any cause whatever."

The case dealt with the damages that Syncrude could recover as a

direct cost of repairing the boilers was excluded by clause 49. In upholding the award to Syncrude, the court stated that damages should be calculated based on the difference in value between what was contracted for, and what was delivered. In making this calculation, the capitalized value of the extra energy



result of three defective boilers designed and built by Babcock & Wilcox. The trial judge awarded \$6 million in relation to the cost of repairing the boilers. However, the trial judge also awarded \$4 million in relation to the extra cost of energy as a result of the boilers being inefficient, from the time of the defect becoming apparent to the date by which Syncrude could have had the boilers repaired. Babcock & Wilcox appealed this decision and argued that the \$4 million portion of the award to Syncrude was covered by the exclusion clause above and not recoverable by Syncrude.

The Court of Appeal did not agree with the Babcock and Wilcox argument that anything beyond the

the contract between the owner and the design-builder provided as follows:

"...and in no event shall [the design-builder] by reason of its performance or obligation under this contract be liable...for loss [of] anticipated profits, catalyst, raw-material and products or for indirect or consequential damages."

As a result of the plant exploding, the owner suffered a number of losses in addition to having to pay to re-construct the plant. In particular, the owner claimed for fixed costs and overheads incurred during the period from the explosion to the resumption of commercial production (referred to as "overheads"). The owner also claimed for increased costs due to the re-constructed plant requiring more catalyst to operate than the original plant configuration (referred to as "catalyst cost").

The English Court of Appeal concluded that losses which "'clock up at once' (namely the cost of idle men and plant etc.)" are direct losses and not consequential losses. Since the overheads started to accrue as soon as the explosion occurred, they were considered direct damages and not consequential losses. In analysing the limitation of liability clause, the court stated that "[w]asted overheads incurred during the reconstruction of the plant, as well as profits lost during that period, are no more remote as losses than the cost of reconstruction." The court concluded that the overheads were not consequential damages and so were not excluded from the claim.

Note, however, that at the same time, the limitation of liability clause did protect the design-builder from the claim for loss of profits because the clause specifically excludes "claims for loss of anticipated profits." Because the limitation of liability clause spelled out those losses in particular, the owner could not claim for lost profits from the design-builder.

As for the cost of additional catalyst, the court found this to be a valid claim for damages. On this point the court said: "The extra cost claimed is the cost which has now become necessary in order to ensure and enable the plant safely to produce methanol in those quantities which the plant was supposed to. In other words, we would hold that this extra cost is akin to any other cost (such as an additional piece of

expenses was taken into account. The court found that the additional cost of energy because the defective boilers were inefficient was not eligible as "consequential" to the damage incurred and therefore was not excluded by clause 49.

The English Court of Appeal also considered consequential damages in a 1998 case, *Deepak Fertilisers and Petrochemical Corporation v. Davy McKee (London)*. The case arose after an explosion destroyed a low pressure methanol plant. The process was licensed to the owner by the designer of the plant, who also constructed the plant through a subsidiary (referred to as the "design-builder"). The limitation of liability clause in

Council Report

Wednesday, March 18, 2004

By: J.A. Blatz, P.Eng.

MITs SEEK VOICE ON COUNCIL

The second Council meeting of the year was held at the APEGM office on March 18, 2004. Council showed continued resolve to become increasingly more effective at governing and become more focused on the vision of the Association – specifically with being relevant to emerging issues and technologies. President Arnold Permut started with some introductory remarks. After the meeting's agenda and the minutes of the previous meeting were slightly modified the meeting got underway.

The first item of consideration was the MIT (Member-in-Training) survey about the registration process. Executive Director Dave Ennis told Council the APEGM is taking the MIT survey to heart. Among other things, the survey indicated that MITs would like to see a non-voting member on the Council. Councillor Doug Taniguchi stressed the need to seize the opportunity to bring MITs into a positive role in APEGM. He suggested MIT and Council representatives meet to discuss a process to bring an MIT representative on board to the Council. Council agreed that it wanted options on how MITs can have a better voice on Council and recognized that nearly half of MITs disagree with the required voluntary service hours. Council decided to strike a task force to develop options on how MITs can gain a voice on Council. This would be done in the context of the survey, which indicated that 66% of MITs agree that one of their members should sit on Council as a non-voting member.

After a thirty minute lunch break Council heard a well-thought through presentation by Dr. Digvir Jayas, P. Eng., examining the interface between science and engineering and the commonalities with the nanotechnologies issue. President Permut added that it is in the interest of the Association to be at the forefront of emerging technologies. The motion was carried that

Ron Britton bring to CCPE the APEGM Council's position that the field of engineering should include the application of emerging technologies such as biotechnology and nanotechnology.

President-elect Alan Silk gave a review of compliance of global governance commitment with specific reference to the ends of the governing policies, Council's role and job description, committee principles, and committee structure.

Councillors then reviewed the training session they had the day before on policy governance. It was agreed that annual policy governance reviews be carried out especially for the benefit of new councillors in the fall after the AGM.

Council reviewed the terms of reference and the terms of office of persons serving on committees for which there is an appeal route to the Council.

It was agreed that monitoring reports will be undertaken by Council members in four areas: Council and committee expenses, cost of governance, primary Council linkages, and governance succession.

Council reviewed a number of informational items. Dave Ennis reported on the financial statement and the shortfall in membership dues. President Permut discussed the progress that has been made with the ENGAP program. There has been interest in the Thompson and Kelsey Chapters to participate in the project. The ENGAP (Engineering Access Program) is designed to ensure students of Aboriginal ancestry have access to the Faculty of Engineering.

The last item was a self-evaluation of the meeting and the consensus was that the meeting was proactive and future oriented, that decisions were made collectively, and that strategic leadership was provided by focusing on the ends.

All motions were passed without opposition. The meeting was adjourned at 5:00 p.m. ■

Resignations March and April 2004

M.M. Altun	G.D. Grief	J.R.R. Muzeen
J.A. Anderson	N.K. Hain	G.D. Ogilvie
R.J. Andriuk	B.S. Hancock	A. Orłowska
M.E. Antonio	M.A. Harris	A. Painchaud
W.M. Arnold	W.N. Hasegawa	M.A. Papini
R.B. Atkinson	M.E. Haukeness	P.K. Patni
D.B. Bachinski	H.M. Haydl	R.A. Piliounis
S. Bagari	C.E. Hayward	R.H. Pinon
C.L. Begg	D.M. Hladun	M.C. Ramsum
C.A. Bell	B.E. Hulvershorn	D.A.A. Reid
N. Blackburn	B.J. Hurndall	C.A. Rempel
R.A. Brown	R.G. Kirby	F. Rizzuto
S.D. Brown	S.R. Kormilo	J.N. Roik
G.N. Bucholtz	G.J. Kriviak	F.I. Rose
R.O. Burt	R.D. Lalonde	E.B. Scalera
D.M. Burt	M.A. Larouche	D.O. Scott
R.C. Butler	W.D. Latiff	G.W. Stary
S.D.W. Carron	M.D. Lawton	M. Sthankiya
W.K. Cheng	M. Lebeau	R.A. Svazas
H. Deng	A.V. Lebedev	B.J. Szafron
R.B. Dodds	M.S. Lennox	J.N. Thompson
D.P. Dudek	L.E. Liem	T.T. Truong
P.B. Elliott	L.E.M. Magalhaes	M.G. Ward
M.A. Ellis	D. Mannsfeldt	P.R. Warkentin
J.S. Fedorowich	P.J. Marion	R.G. Wedman
T.A. Fekete	M.J. McCormick	B.A. Wellenbrink
G.S. Gabriel	R.K. McLean	E. Williams Portal
K. Gartly	B.R. Megli	B. Yee
R.R.B. Gibson	R.L. Middleton	H. Zhu
C.B. Gilbert	L.B. Mihalik	
M.J. Grant	M.L. Mikhail	

Certificates of Authorization Issued March and April 2004

598525 B.C. Ltd. DBA Point One Engineering
CWA Engineers Inc.
Dynamo Electric
EMA Canada Inc.
Geokwan Environmental Ltd.
High Time Industries Ltd.
J.S. Redpath Limited
Keen Engineering Co. Ltd.
Maxwell Bailey McInerney & Associates Consultants Ltd.
Pine Falls Technical Services
The Canam Manac Group Inc.

Certificates of Authorization Discontinued

ADI Limited
C & V Engineering Ltd.
D.H. Charles Engineering, Inc.
DEC Design Mechanical Consultants Ltd.
Frey & Associates Engineering Ltd.
Hasegawa & Associates Ltd.
Kassian Dyck & Associates
M.A. Steelcon Engineering Ltd.
PPL Professional Services Inc.
PWN Engineering Ltd.
Reed-McCallum Engineering Ltd.
Rempel Engineering
Science Applications International Corporation

Update from the Women's Action Committee

By: B.A. Danielson, P.Eng.

Many APEGM members know that a small group of female engineers makes a big presence several times a year at networking events hosted by the Women's Action Committee. The main goal of the Women's Action Committee is to attract women to engineering and geoscience, and to help retain them once they join these professions. To fulfill its goals, the Committee hosts networking events and will soon be participating in mentorship and outreach programs to help young women to understand and choose a career in engineering or geoscience.

Attendance at networking events has grown over the past few years. Women make up about 8% of the APEGM population, or 331 members. Until recently, getting a significant number out to an event was quite a challenge. However, we now typically have 40 or more attendees, which is impressive considering our population base!

Informal surveys tell us that varying the types of events, and having invitations emailed to our target audience have made the biggest difference in attendance. Our thanks go to the APEGM office for their crucial support in this.

One of our most popular recent events was a wine and cheese evening held at The Forks, and hosted by Mo Razik, Proprietor of Fenton's Wine Merchants Limited. A retired engineer, Mo gave a fascinating presentation to accompany a wonderful selection of wines and cheeses. Thank you Mo for making this a memorable evening for all!

If any member of APEGM would like more information about our committee or its activities, please contact the office at 474-2736 to get in touch with us. If you would like to receive emailed invitations to our events, please also make sure APEGM has your correct email address. We look forward to seeing you at an upcoming event! ■

Complying with PIPEDA

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inherent in his/her role as Privacy Officer (but not the ultimate accountability), so most Privacy Projects involve a team approach.

3. Meet with a privacy lawyer to understand what is involved in designing and implementing a Privacy Project.
4. Complete a Privacy Impact Assessment, as well as Data Flow Questionnaires for every personal information cluster in the firm. These are critical foundation documents that need to be carefully completed at the beginning of any Privacy Project.
5. Based on the information gleaned through the completed Privacy Impact Assessment and Data Flow Questionnaires, prepare the balance of the core Privacy Project Documentation (including a Commitment to Privacy, a Privacy Protection Pledge, a Privacy Policy and a Personal Information Protection Agreement (the latter of which needs to be signed with every third party to whom an organiza-

tion discloses personal information).

6. Structure the Privacy Project on a risk minimization basis. That is, identify and resolve the areas of highest risk first (the greater the sensitivity of the personal information being collected, used, and/or disclosed, the greater the risk).
7. Breathe life into the Privacy Project through the proper training of employees. The importance of this task cannot be overemphasized. In this regard, while the Privacy Project Documentation is obviously important, an organization's employees (particularly those who deal with the collection, use, and disclosure of personal information in their day to day activities) must fully understand why it is so important that the organization comply with PIPEDA.
8. Engineering or geoscience firms that have not yet started their Privacy Project should do so as soon as possible. No firm wants to lag behind the rest of its profession in terms of PIPEDA compliance. Not only do you

Practicing Hydrogeology

By: R.N. Betcher, P.Geo.

As a practicing hydrogeologist in Manitoba over the past 25 years I have had the opportunity to review a large number of reports describing the findings of investigations of a variety of aspects of the groundwater geology of the province. It has been a pleasure to review many of these reports, which have described comprehensive professional investigations and presented insightful analysis of the findings.

Other studies and reports however, have not been to the same standard. Some, in fact, have been woefully inadequate in terms of the field, laboratory, and office work undertaken, and the apparent lack of basic understanding of geology and hydrogeology that has been demonstrated. Groundwater does not flow up the hydraulic gradient as one report would have us believe, monitoring wells with six meter screens are not appropriate sampling devices to examine seepage from lagoons constructed into shallow sand aquifers, groundwater does not move at rates of kilometers per month in fine sand aquifers, and the elevated concentrations of many parameters found naturally in pore waters in Lake Agassiz clays do not necessarily indicated contamination by leachate.

As members of a professional organization, it is incumbent on all of us to follow the basic tenet that we should not undertake work for which we are not suitably qualified. The APEGM refers us to NE 43-101 developed by the Canadian Securities Administrators as defining a qualified person (in their case related to mineral projects, and I have left out the references to mining studies in the definition) as an

individual who:

- a) is an engineer or geoscientist with at least five years of experience;
- b) has experience relevant to the subject matter; and
- c) is a member in good standing of a professional association.

Part b) is key here – an individual must have "experience relevant to the subject matter". However, since the definition does not specifically define the term "experience", and the subject matter of hydrogeology is so broad, how does one assess whether in fact one is a qualified person to undertake a specific study? It appears that under current practice in Manitoba, this decision is left to the individual engineer or geoscientist or, collectively, to the firm for which they work. In some instances it appears that a liberal definition of a qualified person has been applied, with a poor quality study and report being the result.

In my view, and in discussion with other hydrogeologists in our Association, groundwater work being undertaken by unqualified individuals in Manitoba is an issue that we need to address. The question is, "What approach should be taken?" The rules of our Association encourage each of us to personally contact other members of our Association who have, in our opinion, carried out a study in a non-professional manner or made a significant error in carrying out a study. More formally, any of us may file a complaint with the Association about another member doing poor quality work or undertaking work for which he or she is not qualified. While these approach-

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run the risk of a breach of PIPEDA, which could trigger the adverse consequences described above, you may also lose customers to firms who can provide the PIPEDA compliance assurances that those customers are seeking. In this regard, firms in virtually every profession and in virtually every industry are already using PIPEDA compliance for competitive advantage. It is anticipated that such action will only intensify in the future. In closing, complying with

PIPEDA is not rocket science. However, it typically involves a lot of hard work, as well as a fundamental rethinking of how an organization views and deals with personal information. It also requires a dedicated, pragmatic, and prioritized methodology that recognizes that, first and foremost, PIPEDA compliance is a business issue. ■

David Carrick chairs the Tekno Law Practice Group of Aikins, MacAulay & Thorvaldson LLP, and has been a Privacy Lawyer since 1999.

THOUGHTS ON

Design

...and what's that strange smell?

By: M.G.(Ron) Britton, P.Eng.

An acquaintance in the wood working business related a story about his plans to hire a young engineer. The candidate in question, a new graduate, was full of ideas and confidence. He had been very impressive in the interview. Clearly this young man was well aware of the theories of manufacturing, computer control, inventory management, computer aided design and drafting, and many other concepts that were unknown when my acquaintance first started business. As the interview was about to wind down, this potential employee was offered a shop tour. Upon entering the shop, the young man immediately asked, "What's that strange smell?" The company had a contract to produce bedroom furniture for the Department of National Defence. The chests were being lined with Western Red Cedar. The interview was no longer a success.

My initial reaction to this story was to dismiss it as the inexperience of youth. However, the more I

thought about it, the more I came to realize that it was a broader comment on the fundamental knowledge base of our profession. Those who use engineering services expect us to be both technologically sophisticated and practical. If, and when, we are seen to be uncomfortable in the work-a-day world in which our designs are meant to function, our perceived value takes a sudden drop.

Peter Frise, P.Eng., from the University of Windsor addressed the issue of our knowledge base in his paper entitled *The Duality of Professional Knowledge*. He identified the two distinct types of knowledge we require as Factual Knowledge, founded on a formal, academic, science/math base, and Experiential Knowledge, founded on hands-on "know-how". The caveat relating to Experiential Knowledge acknowledges that this is more "knowledge of" than "skill with". In other words, to be compe-

tent designers, engineers need to know both how to do things, and why they need to be done.

Factual Knowledge is typically the result of basic education and professional upgrading. Experiential Knowledge, on the other hand, grows as one gains an understanding of where "facts" fit into the realities of our industry. Notwithstanding the different origins of the two knowledge sets, it is critical that they both form a part of the skills engineers bring to the design table.

University programs today run heavy toward the Factual Knowledge side of Peter's "duality". The very complexity of our design "tools" leads to computer simulation and constrained, rather than open-ended, problem assignments. But constrained problems lead to singular solutions and leave the impression that modern tools create "correct" answers. It is easy to become impressed with the com-

plexity and the power of the "tool" and lose sight of its purpose in the non-academic world. It is difficult to understand the limitations of these "tools" when you concentrate on learning how they work. It has been said that those who own a hammer see everything as a nail.

Our job, as engineers, is to design solutions to real world problems. This often requires the design "tools" recent graduates are taught to use. However, the application away from the classroom is unconstrained and therefore more complex. It is impossible to consider all variables. As Cyrus Shafai noted, we try to "give our students the technical knowledge so they can decide what variables to ignore." And that takes us back to Peter's Experiential Knowledge.

Creating, and maintaining, this duality is a tall order given the complexity of the world we work in. As scientists discover more complete and accurate explanations of the way things work, engineers gain new ways to solve old problems. We also develop a need for deeper understanding of the background upon which these new opportunities are founded. Time becomes our enemy and specialization becomes our reaction.

Universities can, and do, produce graduates who are very capable operators of very complex analysis "tools". Employers then compound the problem by focusing their hiring on new staff with the skill to operate specific new "tools". But while having a "tool" skill is a useful, if time-limited, asset, engineers are hired to design. Design requires that we seek solutions, not "tool" applications. Solutions demand an understanding of the "space" into which the analysis "tool" will eventually fit.

Within most universities there are attempts to provide students with a better understanding of the world beyond the campus. Experiential Knowledge is gained from non-academic environments, not classrooms. To build this element of the knowledge base into the undergraduate experience, there is a need for assistance from those companies who will employ our graduates. Professional education is too important to leave as the exclusive domain of academics. ■

Putting the Engineering into Fall Protection

Continued from page 3

one of these experts. Greg chaired the working group on this new design code standard, and after working with me on Manitoba Hydro's fall protection needs, he invited me to join and assist the working group in writing this standard. The standard calls for dramatic changes to the way we design and use fall arrest systems, and is primarily for professional engineers. Part of the dramatic changes include the requirement of a professional engineer's sealed drawing, including the entire system of sub-assembly attachments for which an anchor point is designed. The standard includes formulas and guidelines, required safety factors and types of loading to be considered, much like the limit states design, and allows for consideration of shock absorption and swing falls.

CSA has now published this design guideline created by the working group, titled "CSA Z259.16-04 Design of Active Fall Protection Systems". It is available for purchase, both in hardcopy and PDF format. The standard specifies requirements for the design (by a professional engineer) and performance of complete active fall-protection systems, including travel-restraint and vertical and horizontal fall arrest systems. It should be noted that this standard has only recently been published, and therefore has not yet been adopted into Manitoba Workplace Safety & Health legislation.

This design guideline on fall protection is the first of its kind in the world. I consider it a privilege to have been part of the team that created this standard. The full CSA TCFP is going on to further define and standardize other aspects of fall protection, such as the testing and manufacturing of anchorage connectors, flexible horizontal lifelines,

and the management of fall protection for companies with workers exposed to this danger. Many of the members of the TCFP committee are also members of the International Society for Fall Protection (ISFP) (online at www.isfp.org). Members of the ISFP include safety professionals, engineers, managers, and workers in many different fields who work with, or are interested in, fall protection issues. It includes anyone involved with, or interested in, regulatory compliance issues relating to fall protection and working at heights, as well as the engineering, ergonomic, and medical aspects of fall protection, and those involved in the development and promotion of international standards.

The CSA TCFP members are taking the lead worldwide in this developing industry, and I encourage those interested to look for upcoming developments from them through CSA standards and the activities of the ISFP. ■

ANSI Pump and Mechanical Seal Reliability

By: S.D. Baker, EIT

After being involved in the pump industry for ten years, I am still amazed at the decisions made on pump purchases. I think, "Why did they buy that cheap pump? It will fail in one year, its seal will leak, its bearings will be shot, and it is probably not even repairable." There are always expensive problems centered around pumps that have to be fixed, and that cause a constant drain on a company's maintenance team and a company's bottom line – profit.

Studies indicate the typical life expectancy of components in an ANSI pump: mechanical seal 1.2 years, bearings 3.0 years, coupling 4.0 years, shaft 15 years. With today's pump technology, pump maintenance cycles should be three years, and we should be trying to push to the five year limit.

A typical ANSI pump installation in industry has a lifetime of 20 years (see Figure 1). Initial purchase cost is only 5% of the total cost of a pump over 20 years. Maintenance makes up 41% of the cost over the 20 years. If the proper pump and mechanical seal are selected at the start, a yearly pump failure could be

increased to once every three years or even five years.

Every few months, I come across a problem pump, which really should not have been problem if the proper work and understanding of the system was done on the original installation. As well, operations change over the years, and may no longer suit the existing pump. ANSI pump problems are caused by wrong operation, wrong pump size, wrong mechanical seal, and wrong material of construction. This does not cover all problems, but most.

If we dig deeper into the 41% maintenance costs, we find that the main cause of pump failure is the sealing device (Figure 2). If seal life can be extended from the average of 1.2 years to about three years, there are great savings to be made. This could be thousands of dollars for a small pump, to hundreds of thousands of dollars to be saved on a large pump population.

Only 10% of seals achieve normal life. By breaking down the causes of seal failure we see that operational, mechanical, and system design make up the bulk of these failures (see Figure 3). It is impor-

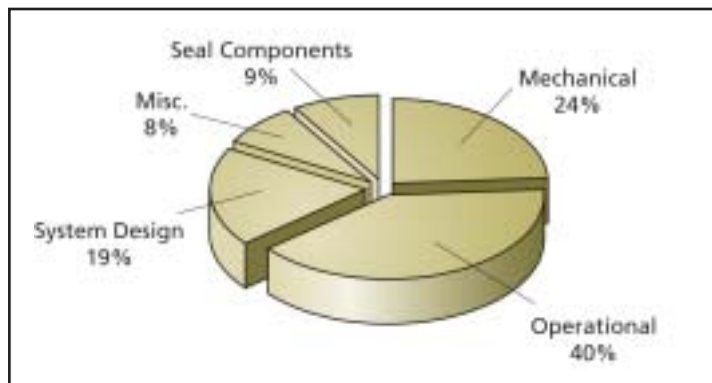
tant for operations personnel to know the limitations of the pump, or damage/failure will occur. If we go way back in time to the original installation, many of these problems could have been avoided or minimized by proper system design – hence proper pump and seal selection to suit the service, plus proper training of operations personnel.

shape, then it probably is a true seal failure.

There are several stuffing box configurations. Some of the main types are straight bore, taper bore, and big bore.

Straight bore stuffing boxes are poor designs based on old technology, thought up in the days when packing was king. This arrangement does not properly dissipate heat or expel solids or vapor. Stuffing box temperature in straight bore stuffing boxes can be 20°F greater than the

Figure 3: Basic Causes of Seal Failure



Preventing these types of problems begins with the selection of proper equipment. The recommended operational window of an ANSI pump is 85%-110% BEP. There should be no bearing problems if operating within this window. Reality dictates that many installations will not operate in this window. When operating far left of BEP, ensure you know your minimum continuous flow. If a pump operates below minimum continuous flow, the thrust bearing could fail in hours. If a pump is operating outside the 85%-110% BEP range, and bearings/seals are failing in 1/3 the time of your average pump equipment, savings are possible – a pump representative needs to be called in to evaluate the application. A pump representative's services are usually free and a properly trained pump representative will help fix the problem, assuming a reputable pump distributor is available locally.

If the pump has a leaking seal that needs replacing every year, this should be evaluated – a proper seal should last three years. I think the five year window should be pushed on seals on solid-free solutions. It is important to ensure it is a true seal failure, not a byproduct failure caused from something else such as a bent shaft, misalignment, or pipe strain. If the bearings are in good

working product. Many working liquids are already at their temperature limit, and increasing the temperature could cause flashing in the stuffing box.

Taper bore stuffing boxes are the current industry standard on ANSI pump installations. These should be used on all applications unless there is a problem with high temperature flashing. Taper bore with particle ejectors will help prolong seal life by providing adequate cooling to the faces and eject solids/vapor from the stuffing box.

If there is a temperature/flashing problem, use the big bore stuffing box with a carbon or stainless steel bushing along with a plan 11 flush to increase the stuffing box pressure, which helps prevent flashing.

Mechanical seal selection is very important. Cartridge seals are the standard these days. A good quality cartridge seal will cost about double that of yesterday's component seal, but it is a quick, easy change with no measurements required. A cartridge seal is a good investment over the life of the pump – much more dependable than a cheap throw-a-way type pusher component seal.

In summary, the majority of pump problems can be prevented by:

Figure 1: 20 Year Life Cycle

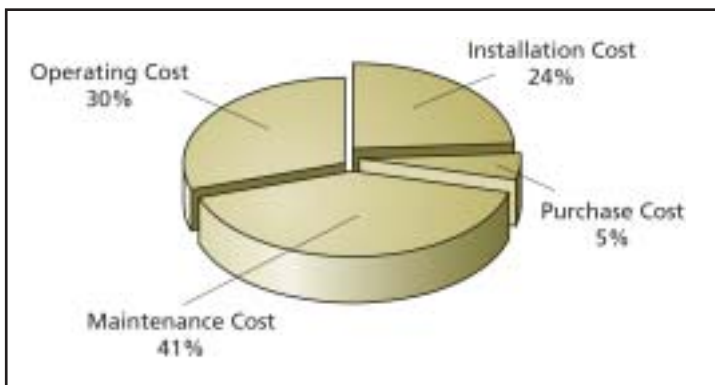
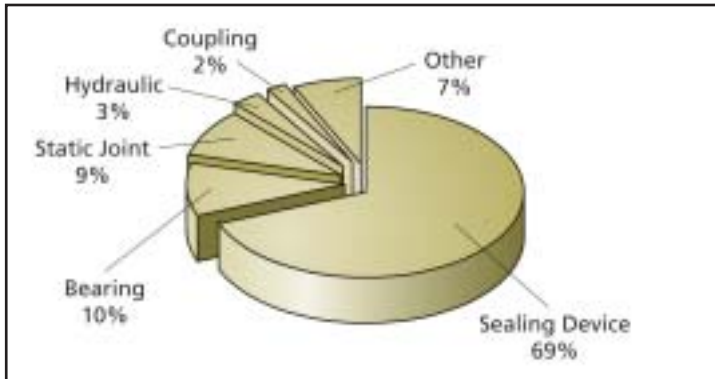


Figure 2: Causes of Pump Failure



Consequential Damages

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plant or part) which achieved the same result. This could not be categorized as an indirect or consequential loss or damage nor could its cost be categorized as constituting a loss of profit."

Consequential damages are not simply damages incurred beyond those that have directly affected the property. Consequential damages are those losses foreseeable with special knowledge. When negotiating a contract the parties should consider which damages they expect to be recoverable and those which will be excluded, or limited. Exclusion clauses must be drafted clearly as courts will only enforce the narrow meaning of the words used to exclude or limit responsibility. Where the parties agree to exclude or limit damages for overheads, loss of profit, or additional costs to bring the project back to the level it was contracted to operate at (for instance the boiler specifications in the Syncrude case, or the use of catalyst in the English case), then those potential losses should be specifically and clearly excluded or limited by the terms of the contract. Relying on a general exclusion as to consequential damage will not afford protection against those kinds of losses.

The ACEC Prime Agreement between Client and Engineer con-

tains a limitation of liability clause that specifically relates to consequential damages, in Schedule C:

"C.3 The Engineer's liability with respect to any claims arising out of this Agreement shall be absolutely limited to direct damages arising out of the Services, and the Engineer shall bear no liability whatsoever for any consequential loss, injury or damage incurred by the Client, including but not limited to claims for loss of profits and loss of markets."

Given the interpretation of direct damages and consequential damages in the two cases above, clause C.3 may not provide any more protection to the engineer than the clauses in those cases did.

Careful consideration should therefore be given to what the parties consider to be direct losses and consequential losses. If there are particular foreseeable losses or damages that are to be excluded by contract, then they should be identified in the contractual terms. ■

W.J. Kenny and E. Jane Sidnell are lawyers with Miller Thomson LLP in Edmonton and Calgary respectively. E-mail: jsidnell@millerthomson.ca.

¹ Unidentified case quoted, with disapproval, by Willes J. in *British Columbia and Vancouver's Island Spar, Lumber and Saw Mill Co. Ltd. v. Nettleship* [1861-73] All E.R. Rep. 340 (C.P.)

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ANSI Pump and Mechanical Seal Reliability

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■ the proper selection of the equipment at the start of the project – select the equipment to suit the operating conditions and design the operating conditions

to suit the equipment;

- train operators and maintenance personnel – know the pump's limitations;
- examine the existing pump installations that have 1/3 the life of the general pump population and troubleshoot the problems – then fix the problems, rather than just replace parts. ■

Practicing Hydrogeology

Continued from page 9

es can be taken, let's face reality here: who among us wishes to individually police other members of our Association, particularly when this action may need to be undertaken several times a year?

A better approach, I believe, would be for this issue to be approached in a broad way to ensure that only qualified individuals undertake groundwater studies in the province. Other provinces have, or will need to, face the same issue. In B. C., Part 4 Contaminated Sites Remediation of the Environmental Management Act would allow a director to:

"designate classes of persons who are qualified to perform activities that under the regulations or a protocol may be or are required to be performed by a qualified professional" and "establish a roster of persons who are in a class designated under subsection (1)"

In this case the director, acting

for the Minister, may determine who is qualified to practice hydrogeology when undertaking a contaminated site investigation. Ontario has a somewhat similar approach when dealing with contaminated sites, whereas in Saskatchewan, members of the APEGS must be registered as hydrogeologists with the Association to undertake groundwater studies in the province.

I would argue that in Manitoba it is time for our Association to take a proactive approach to ensuring that groundwater studies are undertaken by qualified individual(s). This is a complex task that must start by defining the terms "hydrogeology" and "hydrogeologist" – not an easy thing to do! The process will also undoubtedly ruffle some feathers. However, if we are to keep groundwaters in the province from flowing up gradient, it is something that our professional association must work through. ■

R.N. Betcher is the Vice President – Technical, Canadian National Chapter, International Association of Hydrogeologists

Transvaal Roof Collapse, Russia

By: P.H. Boge, P. Eng.

It was 7:15 in the evening on Valentine's Day when patrons at the Transvaal Water Park in Moscow heard a tremendous cracking sound overhead.

One of them, Roman Yazymin, 29, had been sunbathing in a solarium when he heard a loud crash. "It wasn't an explosion, but the noise of metal collapsing," he told The Associated Press. The reinforced concrete roof, about the size of a soccer field, collapsed from a height of 20 meters, killing 27 and injuring more than 100.

While the disaster struck only eight days after 41 people died from a bomb explosion on a Moscow subway train, Moscow Mayor Yuri Luzhkov ruled out the possibility of this being a terrorist act. Causes for the collapse have since focused on engineering and/or construction aspects.

Emergency Situations Minister Sergei Shoigu told a news confer-

ence that "an initial inspection of the bottom of the pool and of the building's foundation has shown that there are no cracks. Had there been any tectonic motion, they would have appeared."

Shoigu resolved to determine the reason for the failure. "Whoever made a mistake has to answer for it. This irresponsibility cannot go on forever... The country needs very rigorous controls for the safety and diagnosis of structures," he said, adding that all roofs of the same type in Moscow were being checked.

Although the investigation has not reached a conclusion, theories of the cause of collapse have been widespread including a build-up of snow on the domed roof, corrosion in support beams from the contrasting temperatures inside and outside, faulty construction and maintenance. ■

APEGM VISION

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

Sources: The Associate Press; The Russia Journal; Moscow Times; Reuters
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