ENGINEERS AND GEOSCIENTISTS BRITISH COLUMBIA MARCH/APRIL 2019

INNOVATION

THE HUNT FOR BATTERY MINERALS

IS BC READY FOR A GEOTHERMAL BREAKTHROUGH?

HIDING IN PLAIN SIGHT

SPRING THAW REVEALS "MAMMOTH" BC CAVE

PM40065271

If you think BC is beautiful, help your great grandchildren to agree.

Nature Trust Property: Twin Lakes
Photo: Graham Osborne

BC's critical natural habitats need protecting. That's been our mission since 1971. As a non-profit organization, we've helped protect and restore over 175,000 acres of ecologically sensitive land throughout the province. But much remains to be done to protect BC's incredible natural diversity. If you'd like to help with this task, we would be grateful for your donation. What's more, future generations will thank you.

To learn more about us or make a donation, please visit naturetrust.bc.ca or call 1.866.288.7878

NATURE TRUST
BRITISH COLUMBIA

INNOVATION

March/April 2019 | VOLUME 23 NUMBER 2

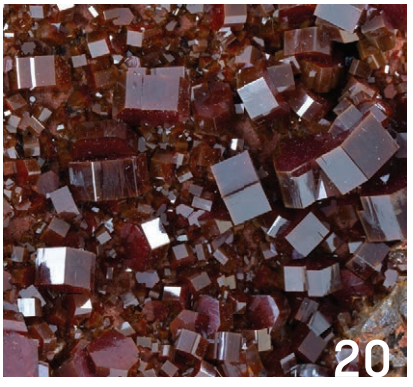
COVER STORY

HIDING IN PLAIN SIGHT

Previously thought to be a sinkhole, this Wells Gray Provincial Park feature escaped attention largely because it was often covered in snow. But in 2018, a springtime helicopter flyover delivered a much better look, and a very big surprise.

THE HUNT FOR BATTERY MINERALS

BC might be known around the world for its rather short list of minerals. But as the demand for electric cars continues to skyrocket, so does the demand for the rarer minerals required to make their batteries. Could BC play a part?



IS BC READY FOR A GEOTHERMAL BREAKTHROUGH?

BC has plenty of geothermal energy potential, but no geothermal power plants. A depleted natural gas field near Fort Nelson may soon change that.

NEWS / DEPARTMENTS

COMMENT

OTHER

ON THE COVER

This Wells Gray Provincial Park feature could be one of the biggest caves in Canada. PHOTO: JOHN POLLACK

ENGINEERS & GEOSCIENTISTS
BRITISH COLUMBIA

DR. KATHERINA TARNAI-LOKHORST, P.ENG., FEC, President
president@egbc.ca

THE BEDROCK OF A DIVERSE AND INCLUSIVE FUTURE

We know that our professions are changing and progressing. Of course, part of this progression relates to practice and technology: we should be proud that our professional practice is so highly advanced. Our progress in these areas elevates the quality of our work, strengthens trust with the public, and improves the world in which all live.

This spring, we are reminded that our professions are also progressing toward more inclusion and diversity. We have all seen the documentation verifying that organizations are more effective, productive and successful when they are diverse and inclusive, so it makes sense for *our* professions to reflect different voices and perspectives — and different ways of creating knowledge.

I was very excited about the association's work to support gender diversity and inclusion during the month of March. For example, to celebrate National Engineering and Geoscience Month, the association organized a collection of community- and family-oriented events designed to engage and grow public understanding and appreciation of engineering and geoscience. Through moments of connection, we've sought to inspire boys and girls to be scientifically curious, and one day to consider a career in our professions.

I was thrilled to see young girls strongly represented in events like Science Games, popsicle-stick bridge-building competitions, branch outreach events, and our drawing contest. It was especially encouraging to see them tackle the Science Games challenges with such enthusiasm and energy. Events like these demonstrate how the value of diversity is taking hold among students.

Our efforts towards diversity didn't end in March. I'm grateful for the ongoing work of the Women In Engineering and Geoscience Division, and their efforts to encourage and promote women in our professions. The Division has already held three events in 2019, and has several more planned in conjunction with International Women in Engineering Day (IWED)—a campaign to raise the profile of women in engineering and the opportunities available to girls—slated for June 23. IWED has quickly gained steam worldwide since its inception just three years ago.

I'm also thankful for the 30-by-30 champions throughout our association who are committed to raising the percentage of newly licensed engineers who are women to 30 percent by the year 2030.

The momentum towards diversity and inclusion we experienced this spring has been encouraging. Let's keep it up: we still have lots of work to do. The ultimate goal is to ensure our professions meet the diverse challenges that the world demands—demands that we can only meet if we're committed to diversity ourselves.

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Bryan Fitzpatrick

Joe Fitzpatrick

Celebrating 30 Years!

Our family has been proudly serving the **Engineers and Geoscientists of BC** since 1989. Thank You!

"In 1989, my father Bryan Fitzpatrick, and my grandfather Joe Fitzpatrick, developed an exclusive insurance program for the Engineers and Geoscientists of BC.

Since then we have insured thousands of engineers and geoscientists from around the province.

My father and I are very proud to be carrying on my grandfather's dream. We are proud to be celebrating 30 years as an Affinity Partner of the Association."

Thank you for your support!

Chelsea Fitzpatrick
Vice-President of Operations

Chelsea Fitzpatrick

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A TELECOMMUNICATIONS AND COMMUNITY LEADER, PASSES AWAY

With sadness and with great admiration for a life well-lived, we announce the passing of Gordon Frederick MacFarlane, P.Eng., at the age of 93. Born in Victoria, BC, Gordon served as a bomber aircraft pilot during World War II. Following the war, he graduated from UBC as an electrical engineer. In 1950 he joined BC Tel (which later became TELUS), quickly ascending to the positions of Chief Engineer and then Vice President. Gordon then became President of Automatic Electric in Brockville, Ontario, and subsequently returned to BC Tel in 1977 as Chairman of the Board of Directors and CEO. He held these positions until his retirement as CEO in 1990, and as Board Chair in 1997.

One of Gordon's professional legacies was starting Microtel Pacific Research (MPR), which became the destination for developing electrical engineers and high-tech CEOs in Western Canada. MPR was responsible for the creation of many of the top technology companies in BC.

Gordon served our community in many ways, including twice as Chairman of the United Way, and 11 years acting on the Board of Directors of the Vancouver Aquarium, eventually as Chairman. He also served on the Premier's Economic Advisory Council, the Business Council on National Issues, and the Boards of Directors of UBC, SFU, BCIT, the Bank of Nova Scotia, BC Gas, Air Canada, and Fletcher Challenge.

Gordon received numerous well-earned distinctions over his career, including recognition by the Canadian engineering profession with the McNaughton Gold Medal Award in 1982; the federal Department of Communications lifetime achievement award in 1988; and Engineers and Geoscientists BC's R.A. McLachlan Award in 1989.

He also received an Honorary Doctor of Laws Degree (LLD) from UBC in 1991; he was also appointed to the Order of British Columbia the same year, which noted him as having "guided the transformation of the province's major telecommunications utility into one of the most attractive places in Canada to work and invest."

Ann Patterson
Belcarra, BC

JOHN BREMNER, P.ENG., FEC (HON.)

Former Executive Director and Registrar of Engineers and Geoscientists BC, John Bremner, P.Eng., FEC (Hon.) passed away on March 4, 2019.

Before joining the association late in 1996, John had a distinguished career in municipal engineering, which included the position of Director, Parks and Engineering Services and Deputy Municipal Manager with the District of North Vancouver. He was active in several association committees, industry associations, and in his local branch affairs. John was passionate about his profession—a true professional who supported his colleagues and always looked for ways to reach common ground.

In an interview shortly after assuming his position at the association, John said he hoped to create "an atmosphere that's conducive to change and encourages innovation and risk-taking without fear of failure—because you don't get anywhere if you don't try different ways of doing things." John led several key initiatives and fostered many relationships that built a foundation for the association's success today.

After he retired from the association, John continued to contribute his expertise to the professions including his role as a co-consultant for the nationally recognized *InfraGuide Best Practice Report: Selecting a Professional Consultant*. He was named a fellow of Engineers Canada in 2011 and an honorary fellow of Geoscientists Canada in 2013.

The association offers its condolences to John's family and his wife, Val Bremner, whose support and generosity was invaluable to John's career and his contributions to the professions.

PROFESSIONAL GOVERNANCE ACT: SUMMARY OF ENGINEERS AND GEOSCIENTISTS BC'S RECOMMENDATIONS TO GOVERNMENT

On March 4, 2019, Engineers and Geoscientists BC submitted our formal response to the BC Government's Regulations Intentions Paper Consequent to the Proposed *Professional Governance Act*.

The *Professional Governance Act* (the *Act*) changes the oversight of Engineers and Geoscientists BC and introduces a number of changes to the regulatory framework in BC. Some of the most significant changes were presented in the Intentions Paper.

Working with Council and a focus group of professional members with senior experience in varied disciplines, Engineers and Geoscientists BC has developed policy positions for each of the regulation topics with the goal of offering collaborative advice and considered recommendations for moving BC forward. The first round of regulations addresses the regulation of firms, competency and conflict of interest declarations, and practice rights of professions.

A brief overview of the government's proposed approach for each regulation, along with a summary of Engineers and Geoscientists BC's response, is outlined below

1. **Regulation of Firms:** Under the *Professional Governance Act*, the government is proposing the regulation of firms in BC for all five professions covered by the new legislation. Engineers and Geoscientists BC has spent several years, guided by an advisory task force and working closely with our membership, to develop a corporate regulation model that improves regulatory oversight, protects the public interest, and provides opportunities to organizations to improve their processes and reduce their risk. The government's intentions paper recognizes the strength of the model we have developed, and we believe that this model should act as the basis for corporate regulation in BC. In addition, we support the use of this model for multidisciplinary firms so that these firms need only deal with one regulator and one set of processes. We are recommending to government that these regulations come into effect in 2021.
2. **Competency Declarations and Conflict of Interest Declarations:** Under the proposed *Act*, when a registered professional provides services that are within their scope of practice, they may be required to sign competency and conflict of interest declarations. Engineers and Geoscientists BC supports the principle of transparency and agrees that further disclosure regarding competence and conflict of interest is in the public interest.

CONTINUES NEXT PAGE...

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However, government must ensure that any declarations are not redundant and do, in fact, provide further value commensurate with the resources required to implement such a system. Declarations must be risk-based, must build upon existing processes to increase compliance, and must reduce duplication. We recommend that the government uses assurance statements, a system used already by many qualified professionals to implement this new requirement. Finally, these declarations should be centrally and electronically filed with the Province of British Columbia, not the regulator, and be public and searchable to increase transparency.

3. **Independent Practice Rights of Professions:** The proposed *Act* enables the granting of practice rights to all five professions covered by the new legislation. This includes providing independent practice rights for engineering technologists, who are regulated by the Association of Applied Science Technologists and Technicians of BC.

   Engineers and Geoscientists BC is very concerned that a separate parallel regulator for certain aspects of engineering presents a risk by creating confusion for the public, government, and employers; it will also create duplication and inefficiency. Moreover, having separate regulatory bodies will limit the opportunities for the regulatory model in BC to respond in a flexible and timely manner to changes in the field of engineering.

   The single-regulator model is currently applied for most other professions in BC—foresters, veterinarians, lawyers—and should be followed for engineers and engineering technologists. Engineers and Geoscientists BC is recommending that all work that falls within the definition of the practice of engineering (including engineering technology) should be regulated by a single government-designated regulator whose mandate is to regulate the practice of engineering. Engineers and Geoscientists BC supports independent practice rights for engineering technologists and we recommend that our existing Limited Licence program should be used to achieve this objective for qualified individuals.

The *Professional Governance Act* was brought into law by the BC Legislative Assembly on November 27, 2018. The *Act* represents the culmination of government's Professional Reliance Review, which examined the current legislation governing qualified professionals, and the role their professional associations play in upholding the public interest.

While the new *Act* includes significant changes to the regulatory framework for engineers and geoscientists, the full impact is not yet known as implementation will occur in stages and is expected to take several years.

NEXT STEPS

We continue to engage with government and other stakeholders to articulate our concerns regarding these proposed policies. We will continue to advocate that any changes must benefit the overall public good and follow the principle of "right touch regulation"–using the right amount of regulation to achieve the intended outcome; no more and no less.

This is a process that is expected to take several years. In order to positively influence the outcome of this process, Engineers and Geoscientists BC will continue to contribute constructively to the discussions with government, ensuring they understand the complexities and risks—and positive alternatives—to any proposed policy change.

MORE INFORMATION

More information about the *Professional Governance Act* is available at *egbc.ca/Professional-Reliance*.

Read the January/February *Innovation* article, "New Governing Legislation for Engineering and Geoscience in BC". Previous editions of *Innovation* are available at *egbc.ca/innovation*.

If you have questions, please email *professionalreliance@egbc.ca*.

VALIDATE ENGINEERING EXPERIENCE THROUGH *COMPETENCYASSESSMENT.CA*

In BC, the process of applying for licensure as a professional engineer, and the evaluation of supporting engineering experience occurs online. Last spring, Engineers and Geoscientists BC transitioned its competency assessment process to a new website called *competencyassessment.ca* that also supports the experience evaluation process for a number of other provincial regulators. While the process for online application has not changed for BC applicants, the domain name and *competencyassessment.ca* branding is new.

BC professional members are encouraged to note the change in website domain name, as they may at some point receive an email request from *competencyassessment.ca*, asking them to verify the engineering experience of a colleague applying for professional licensure.

New applicants for P.Eng. licensure document their engineering experience online through *competencyassessment.ca* and nominate a validator—a professional member or other engineering professional who has typically acted in a supervisory capacity with direct, personal and professional knowledge of their work—who can validate and provide feedback on that experience.

The *competencyassessment.ca* website then sends a request email to the nominated validator, with a secure link to a webpage where they can review and validate the experience submitted by the applicant. The professional member is invited to review the request online and may choose to participate in validation or decline.

This email lists the name of the applicant who is requesting to have their work experience validated. It also has the *competencyassessment.ca* branding, as well as the logos and contact information for the provincial regulator with whom the applicant has applied, Engineers and Geoscientists BC, the Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS), or Engineers PEI.

For questions about validation request emails please contact *info@competencyassessment.ca*. For more information on acting as a validator, please see our website at *competencyassessment.ca/Validators*. General questions about competency-based assessment for professional engineer registration can be directed to Gillian Pichler, Director, Registration, at *gpichler@egbc.ca*.

REVIEW OF CONTINUING PROFESSIONAL DEVELOPMENT PROGRAM UNDERWAY

Since 2017, the Continuing Professional Development (CPD) Committee has been exploring modifications to the CPD program to better guide members in meeting their obligations to stay current in their knowledge and skills in the professional and ethical aspects of their practice areas. The new *Professional Governance Act* will also introduce a number of changes to the way engineers and geoscientists in BC undertake their professional practice, including the requirement for the association to "establish and maintain a continuing competency program to promote high practice standards amongst registrants."

To help inform their review, the CPD committee will soon ask members for their views on possible adjustments to the model, in order to advise government on what will work best to protect the public once this section of the *Professional Governance Act* is brought into force.

The initial member consultations will focus on high-level principles that will guide any revisions to the model, including simplicity, flexibility, and quantity of CPD completed. A survey is planned to be released to members in early April, with additional engagement opportunities to follow.

In examining the current model and potential alternatives, the committee has focused on taking a deeper look at the issues that affect and relate to CPD—including legislative challenges, government expectations, self-assessment research, findings from practice reviews and discipline cases, and jurisdictional research.

For more information on the committee's review, consultation opportunities, and the current CPD program, visit *egbc.ca/cpd-program*.

COUNCIL NOMINATIONS AND ELECTIONS UNDER NEW *ACT*

The new *Professional Governance Act* introduces broad changes to the nomination, election, and composition of Council. These changes will be introduced in stages, beginning with the 2019/2020 Council election.

KEY CHANGES UNDER NEW PROFESSIONAL GOVERNANCE ACT

WHAT'S CHANGING?	HOW IS IT CHANGING?	WHEN IS IT EFFECTIVE?
NOMINATION CRITERIA	A new merit-based nomination process will be established; only those candidates approved through this process are eligible to stand for election. Nomination by 25 members is no longer permitted under the new *Act*.	2019/2020 Council election
COUNCIL COMPOSITION	12 members in total. Of these, 11 will be voting members: • four government-appointed laypersons • five Councillors • one Vice President • one President The Immediate Past President will be a non-voting member.	To be determined; not effective for 2019/2020
COUNCILLOR TERMS	Councillors: three years. President and Vice President: up to three years.	To be determined; not effective for 2019/2020
TERM LIMITS	Councillors: six years in one position, and 12 years in total.	To be determined; not effective for 2019/2020

Phase 1 of the implementation of the *Act* focuses on the merit-based principles for nomination committees to follow for the selection of candidates. This means that, for 2019 election, new merit-based selection principles will guide the Nominating Committee's work.

In the fall of 2019, there will be an election for one President (one-year term), one Vice President (one-year term), and five Councillors (two-year terms).

IMPORTANT CHANGE TO NOMINATION PROCESS

The *Professional Governance Act* directs that a councillor must be nominated by a committee whose purpose is to nominate or select members for election. With the release of supporting regulation this spring, section 25 (1), section 124, and section 118 (2) (g) (iv) of the *Professional Governance Act* will come into force, making association Bylaw 3 (e) Nomination By 25 Members inconsistent with the new *Act*, and therefore invalid. Beginning this year, all nominations for election will be made by the association's Nominating Committee.

Nomination by 25 members will no longer be permissible under the new *Act* and will not be accepted for the 2019 election.

For more information about the changes to Council Nominations and Elections, visit *egbc.ca/council-election*.

NOMINATING COMMITTEE ACTIVELY SEEKING COUNCIL NOMINATIONS

Engineers and Geoscientists BC is governed by a Council of elected members and government appointees. Through the nomination process, we are seeking visionary members to provide strong leadership for Engineers and Geoscientists BC.

In light of the new *Act* that requires a modified approach to Council nominations, we encourage members who wish to run in the 2019 Council election to contact the Nominating Committee to express their interest in becoming a candidate.

WHY GET INVOLVED?

Engineers and geoscientists enjoy the privilege of self-regulation. This means they are responsible for determining and maintaining the standards of admission and practice for their professions. As an organization, Engineers and Geoscientists BC relies on the members' participation to carry out its regulatory functions. Members of Council provide leadership and strategic direction to Engineers and Geoscientists BC, establishing its priorities and policies.

Engineers and Geoscientists BC strongly values the benefits that diversity brings to its Council. We believe diversity and inclusion promote different perspectives and ideas, mitigate against groupthink and ensure the organization has the opportunity to benefit

Dr. Margaret Li, P.Eng., FEC, FGC (Hon), knows the value of serving on Council. She was first elected to a two-year term on Council in 2002, and re-elected in 2004 and 2006, before being elected President in 2008. "It was an enriching and rewarding experience, professionally and personally, to be serving on Council and contributing to the wonderful profession I enjoy," she said.

from all available talent in support of good board governance. Council is committed to promoting diversity and inclusion as part of its nomination process and encourages all members to consider this opportunity.

Professional engineers, professional geoscientists, and licensees in good standing are eligible for office. Councillors are elected for a two-year term, commencing October 19, 2019. The President and Vice President are elected for a one-year term.

HOW TO APPLY

Interested candidates are encouraged to learn more about the role of Council, qualifications, eligibility, time commitment involved to serve, and the candidate selection process by visiting our website at *egbc.ca/council-election*.

On our website, you will also find our Prospective Nominee Form. Completed forms, along with a current CV, are to be sent by email to the Nominating Committee Chair, Caroline Andrewes, P.Eng. at *pastpresident@egbc.ca* by April 8, 2019.

If you are interested in being considered by the Nominating Committee, but are unable to submit your application before the deadline, please contact the Committee Chair. At the Committee's discretion, the deadline may be extended.

COUNCIL CANDIDATE SKILLS AND QUALIFICATIONS

All nominees for Council must be members or licensees (P.Eng., P.Geo., Eng.L., Geo.L.) in good standing. Candidates for the office of President must have served on Council for at least two years, and candidates for the office of Vice President must have served at least one year.

For Council to achieve its goals and meet its fiduciary responsibilities, it has identified the need for diverse voices on Council, with a blend of competencies.

It is not necessary for each member of Council to have experience in each area; as part of its process, the Nominating Committee conducts a gap analysis to identify the skills and experience of continuing Councilors and the complementary skills and experience that would bring value to the next Council.

The Nominating Committee comprises eight professional members or licensees representing Engineers and Geoscientists BC regional branches, and five professional members or licensees appointed by Council. The committee is chaired by the current past president. For more information on the Nominating Committee and the merit-based selection process, visit *egbc.ca/council-election*.

Engineers and Geoscientists BC's Council of elected members and government representatives meets throughout the year to conduct the business of association governance. The following are the highlights of the February 1, 2019 meeting.

Dr. Donald S. Mavinic, P. Eng., FCSCE, FCAE, FEIC, FEC, FWEF

Dr. Victor Lo, P. Eng., Chairman of Boost Environmental Systems Inc., is pleased to announce the appointment of Dr. Donald S. Mavinic, P. Eng., as President and CEO of the company.

Dr. Mavinic is an internationally acclaimed expert in sludge treatment/reduction, energy production and nutrient recovery (phosphorus). He was awarded the NSERC Synergy Award and Manning Foundation Award in 2010. In 2016, he was the recipient of Engineers Canada Gold Medal for his achievements. We are delighted to have him joining Boost to embark on the commercialization of our unique treatment system.

Boost is a UBC spin-off company, specializing in Integrated Waste Treatment System, based on a patented 'Microwave advanced oxidation process' (MW-AOP). This technology includes a MW-AOP, an innovative two-phase anaerobic digestion system, and a struvite recovery process, for organic solids reduction, bio-energy production and nutrient recovery.

Boost's integrated approach can treat any biodegradable organic slurry, but is primarily focused on domestic wastewater sludge reduction and dairy manure management with significant resource and energy recovery.

Contact:

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PROFESSIONAL GOVERNANCE ACT MOVES AHEAD

Council received an update on the newly introduced *Professional Governance Act*, which consolidates oversight of professional regulators across five professions. This new act is an outcome of the BC government's professional reliance review and will eventually replace the *Engineers and Geoscientists Act*.

The *Professional Governance Act* sets out a broad policy framework but requires the development of more detailed supporting regulations before the associated provisions and requirements of the legislation can take effect. Government has initiated the development of several regulations to date, with more anticipated in the near future. Given the potential risk to the organization associated with the anticipated volume and pace of change, Council directed that staff communicate this concern to government and recommend that the pace, volume, and sequence of new regulations be readjusted based on the input of the affected regulators to ensure it is sustainable and achievable.

IMPACT OF LEGISLATIVE CHANGES ON 2019/2020 COUNCIL ELECTION

Engineers and Geoscientists BC is actively engaging government to better understand the *Professional Governance Act*'s impact on the association's Council Nominations and Election. The official regulations governing nominations and elections may not be finalized by government until June. This timing means that the association's September election will need to follow the new nomination procedure and regulations.

More information about plans for the association's Council Nominations and Election is provided on PAGE 10.

UPDATE: VOTING RIGHTS FOR MEMBERS-IN-TRAINING

Responding to a recent review of Engineers and Geoscientists BC's nomination and election processes, in September 2018, Council approved a motion for consultation on extending voting rights to members-in-training (EITs and GITs).

Council has now directed the Governance Committee to consider the implications of the *Professional Governance Act* as they relate to the issue of voting rights for members-in-training. The Governance Committee is scheduled to report on this matter at the September 2019 Council Meeting.

CONTINUED PROGRESS ON CORPORATE PRACTICE

Council approved changes to the terms of reference for the Advisory Task Force on Corporate Practice. The changes provide more detail on Phase 3 of the task force's deliverables, which include developing a business plan to support the introduction of corporate regulation, and consulting with members on how

sole practitioners should be included in a corporate regulation model.

MEMORANDUM OF UNDERSTANDING WITH ACCEPT

Council approved a Memorandum of Understanding with the Association of Chinese Canadian Engineering Professionals and Technologists (ACCEPT). Engineers and Geoscientists BC has existing agreements with the Bangladeshi Engineers and Applied Scientists in BC, Iranian Engineers of British Columbia Association, Society for Punjabi Engineers and Technologists of BC, and the Society of Internationally Trained Engineers of BC. These relationships aim to support practice excellence among engineering and geoscience professionals.

CONCERNS VOICED ON BYLAW CHANGES

Members may attend the open session of Council meetings, and have access to a process that enables them to present at the meeting. Two members attended this meeting to express their concerns regarding the ratification of bylaw changes that resulted in the category of Life Membership or Licensure being repealed, and the introduction of new obligations and a reduced fee for Non-Practising membership.

Council heard the members' concerns and thanked them for attending. Council maintained that no change would be made to the wording of the current Life Membership or Licensure Bylaw.

APPOINTMENTS

DISCIPLINE COMMITTEE

Paul Adams, P.Eng., FEC
Edward Bird, P.Eng.
Peter Bobrowsky, P.Geo.
Juergen Franke, P.Eng.
Bruce Nicholson, P.Eng., FEC
Roz Nielsen, P.Eng.
Ronald Yaworsky, P.Eng.

FAIRNESS PANEL

Garth Kirkham, P.Geo., FGC
John Watson, P.Eng., FEC, FGC (Hon.)

INVESTIGATION COMMITTEE

Dan Kunimoto, P.Eng.

STANDING AWARDS COMMITTEE

Greg Lord, P.Eng.
Don Mavinic, P.Eng., FEC
Carol Park, P.Eng.

HOW DOES THE ASSOCIATION SUPPORT PROFESSIONAL PRACTICE?

A core part of the role of Engineers and Geoscientists BC is providing help, direction, and support for our members in their work as professionals.

The association provides guidance about how engineering and geoscience professionals should conduct their work, in a way that helps them meet their obligations under the *Engineers and Geoscientists Act*, Bylaws and Code of Ethics. The association doesn't instruct or prescribe technical practice; instead, it provides tools and resources to supports professionals in meeting the standard of practice when carrying out their work. From designing retaining walls or onsite sewerage systems, assessing riparian areas or terrain stability, inspecting forklifts, or sealing and retaining documents, the association outlines issues that members should consider in their professional capacity.

To guide our membership, the association maintains a range of resources, such as Professional Practice Guidelines, Quality Management Guidelines, Member Advisories, practice advisors, and a bank of Frequently Asked Questions.

Professional Practice Guidelines are an important resource for members. These are issued by Engineers and Geoscientists BC (published both online and in bound hardcopies), and outline considerations for professionals when carrying out specific engineering or geoscience activities, so they can meet the established standard of practice and their obligations under the *Engineers and Geoscientists Act* and Bylaws of the association. Topics include site characterization for dam foundations, designing guards for buildings, structural design issues for housing and small buildings, legislated landslide assessments, and many others.

Engineers and Geoscientists BC often develop joint guidelines with other technical and professional groups including the Architectural Institute of British Columbia, the Association of BC Forest Professionals, and others. Additionally, Engineers and Geoscientists BC will sometimes endorse guidelines developed by other organizations. For example, *Building Enclosure Design Guide – Wood-Frame Multi-Unit Residential Buildings* is a widely referenced guideline that has received the association's endorsement.

The Professional Practice, Standards and Development team at the association provides professional practice tools and resources to members, members-in-training and licensees. The team comprises engineering and geoscience professionals and licensees from various fields and disciplines. It's their job to help professionals understand their professional obligations and deal with various practice issues.

RECENTLY PUBLISHED PROFESSIONAL PRACTICE GUIDELINES
Whole Building Energy Modelling
Designing Guards for Buildings – Revision
Structural Services for Part 3 Buildings – Revision

PROFESSIONAL PRACTICE GUIDELINES IN DEVELOPMENT
Electrical Engineering for Building Projects – Revision
Retaining Wall Design
Watershed Assessments
Groundwater at Risk of Pathogens
Design and Installation of Elevating Devices in New Buildings – Revision
Building Enclosure Engineering Services – Revision
Geotechnical Engineering Services for Buildings – Revision
Certification of Annual Equipment Inspections
Software Engineering of Safety Critical Systems
Mechanical Engineering Guidelines – Revision

WHAT RESOURCES ARE AVAILABLE THAT I MAY NOT KNOW ABOUT?

A quick tour of *egbc.ca/Practice-Resources* will show the extensive resources the association maintains to support professional practice. In this edition of *Innovation*, we focus on one often-overlooked resource: the Frequently Asked Questions. The Professional Practice FAQ is a list of 25 answers to common, real-world questions, like: what is the process for transferring my projects to another professional? Who owns my design? What if I am asked to review and evaluate the work of another professional engineer?

The next time you have a question about your practice as a professional, start by checking the Professional Practice FAQ on the *egbc.ca/Practice-Resources* page.

UPDATED PRACTICE GUIDELINES FOR PART 3 BUILDING PROJECTS RELEASED

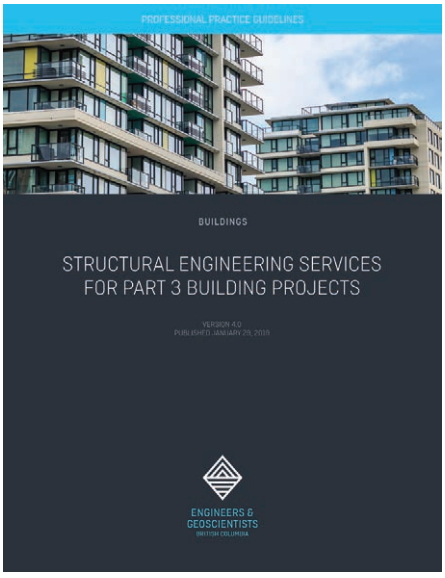
The *Professional Practice Guidelines – Structural Engineering Services for Part 3 Building Projects* were developed to guide professional practice related to structural engineering services for buildings that fall under:

- Part 3 of the *British Columbia Building Code* (BCBC), the City of Vancouver Building Bylaw (VBBL), or the National Building Code (NBC); or
- parts of buildings governed by Part 4 of the BCBC, the VBBL, or the NBC.

These guidelines have gone through numerous revisions since they were first published in 1993; this revision was released on January 29, 2019.

These guidelines address a variety of issues, such as roles and responsibilities, professional practice guidance related to basic and additional structural engineering services, quality management requirements, and guidance regarding letters of assurance in the BCBC and VBBL. This revision of these guidelines provides clarity around the minimum design and documentation requirements for structural permit drawings.

Engineers and Geoscientists BC thanks the Association of Consulting Engineering Companies of BC (ACEC-BC) and the Structural Engineers Association of BC (SEABC) for their input to this revision. To protect the public, Engineers and Geoscientists British Columbia regulates the practices of professional engineers and geoscientists through regulatory tools, guidelines, advisories, professional development, and practice support. To learn more, visit the Practice Resources page on our website, at *egbc.ca/Practice-Resources*.



HIDING IN PLAIN SIGHT

"Mammoth" cave shines global spotlight on BC's Wells Gray Provincial Park

KYLIE WILLIAMS

The oval-shaped cave entrance is the size of a football field and a huge vertical shaft descends at least 100 metres straight down. The Statue of Liberty would disappear if placed inside. Features in the nearby landscape suggest the cave's tunnels and caverns extend for over two kilometres. Despite its size, it went largely unnoticed until now. Has Canada's biggest cave been hiding in plain sight?

Photo: Catharine Hickson, P.Geo.

On April 22, 2018, three biologists boarded a helicopter to fly over northern Wells Gray Provincial Park in southeastern British Columbia to count endangered mountain caribou. The survey followed a standard route each year and was usually completed during February or March, when the park's remote northeastern region is blanketed with snow. This year, however, the survey was conducted in spring, when the snow levels were lower. The crew saw a large waterfall plummeting into a deep void, and what looked like a large cave.

John Surgenor, one of the biologists onboard, took photographs of the unusual landscape feature and shared them with pilot Ken Lancour. When the crew landed in Clearwater, BC, Lancour reported the cave to BC Parks and began asking his local contacts: "What's the name of that park geologist?"

CALL THE GEOLOGIST

Dr. Catherine Hickson, P.Geo., is Wells Gray Provincial Park's de-facto resident geologist. Her long-term relationship with the park began when she mapped subglacial volcanoes in the southern portion of the park in the early 1980s, while working on her PhD. She unravelled the complex three-million-year battle between fire and ice that created what is now known as Wells Gray.

"I mapped there for several summers, got to know a lot of the people, and fell in love with the park," said Hickson, who has worked with Visitor Information Services and Tourism Wells Gray to help create signage for visitors, and written several books about the natural world within Wells Gray. In 2016, Hickson worked with her colleague, lichen specialist Trevor Goward, on an application to add Wells Gray to Canada's tentative list for UNESCO World Heritage status, which would have catapulted the park's profile onto the global stage and provided it unique protection status observed by international treaties. But the application was ultimately unsuccessful this time.

Based on this decades-long relationship with the park, the photographs of the cave arrived in Hickson's email inbox on May 2—just over a week after the helicopter survey. Her first response was, "Oh, my goodness. This is pretty remarkable."

GEOLOGICAL SURPRISE

"As soon as I saw the pictures, I realized that it was, in fact, some kind of cave," said Hickson. "It certainly was not something that I knew about nor would have expected, since that part of the park is mostly high-grade metamorphic rock."

Dr. Catherine Hickson, P.Geo., sits near the entrance of the cave in September 2018.
PHOTO: CATHERINE HICKSON

In the Rocky Mountains to the east of Wells Gray, some of Canada's largest caves tend to form in thick successions in limestone but, in this area of the park, the cave has formed in schist and marble—metamorphosed and deformed versions of limestone and shale. Caves don't often form in these rock types.

Through her association with the Royal Canadian Geographical Society and The Explorers Club, Hickson knew several cavers with decades of experience exploring caves all over the world. She contacted John Pollack, a retired forester and archaeological surveyor whose speciality is surveying archaeological sites and caves.

"I sent him the pictures, and microseconds later he's on the phone," said Hickson.

Over the following two months, Pollack and Hickson studied satellite photographs of the area and discussed the landscape features with two experienced cavers, Lee Hollis and Dr. Chas Yonge. The team could observe a significant stream flowing from two glaciers that feed into the entrance shaft. They calculated a drainage area of about six square kilometres for the potential cave system. A large spring about two kilometres away and half a kilometre lower in the landscape was identified as the resurgence, the point where the river running through the cave returns to the surface. From this, the team calculated a potential length of two kilometres and a depth of 460 metres.

"The size, the big drainage area, and the fact it had a fairly large active stream going into it, looked like it was going to be quite a big one," said Pollack, "We needed to get up there to take a look at it on the ground."

NOT A NEW DISCOVERY

The cave is in the traditional territory of the Tsq'escenemc, (the Canim Lake Band), as well as the Simpcw.

"They're looking back, talking to their elders, to see if they have any information or any stories about it," said Hickson.

Hickson also discovered that a geologist named Bert Struik mapped the feature as a sinkhole in 1984. Struik was a

research scientist with the Geological Survey of Canada, mapping the area as part of a larger project, coincidentally around the same time Hickson was mapping in the southern portion of the park. The two did not work together in the field, but Hickson remembered that he had been in the area of the cave. Struik's detailed maps were never published, but the two are now collaborating on a scientific paper that includes his original detailed mapping.

THE SEPTEMBER 9 RETURN

For nearly five months, Hickson and Pollack learned as much as they could about the cave from the helicopter and satellite photos, but they had little choice but to simply imagine what it must be like to see such a massive feature up close. They planned a much-anticipated trip back to the cave for the week of September 9, when water levels would be at their lowest and winter had yet to arrive. Hickson and Pollack communicated often with BC Parks in the lead-up to the expedition, and obtained the necessary permits to land in the remote region of the park. The expedition was funded by Hickson's company, Tuya Terra Geo Corp., with contributions from Pollack and BC Parks.

"I thought it was important enough in the context of the park, especially with the World Heritage application that we'd worked on for so long," said Hickson. In addition to the pure thrill of exploring an undiscovered cave system, Hickson hoped that the cave would boost the park's chances of being added to Canada's shortlist of UNESCO World Heritage Sites next time the list opened for new additions.

On the morning of September 9, low cloud—bad news for helicopter flights—threatened to cancel the excursion, but the weather cleared just enough to fly. Hickson and Pollack were joined by Hollis, Lancour, and Tod Haughton from BC Parks. The team had just two-and-a-half hours of helicopter time and a narrowing weather window to record as much information as possible about the size and depth of the cave and the geology of the rocks in which it was formed.

"Once you're on the ground, you realize this thing is a mammoth," said Hickson. "It drops down, and you look in to this incredible void. It's awe-inspiring."

As the sole geologist on the trip, Hickson's role was field mapping: making observations about the rocks and landscape, collecting rock samples, and taking structural measurements. She also recorded a video tour from the air and posted it online. It has since "gone viral."

Pollack set up three ground control points around the cave entrance using a TruPulse reflectorless laser instrument. Due to forest fires nearby, he could not use the drone he had brought, so instead he took about 146 photographs with a digital camera while circling the pit in the helicopter, to create a spatially correct 3-D photographically rendered survey of the entrance pit.

"A straight line-of-sight measurement indicated the cave was 137 metres from its lower lip to an archway in the roof of the cave," said Pollack. "Mist from the entrance waterfall obscured the deeper parts of the cave; the visible back of the cave was estimated to be 180 metres from the lip. The passage size is similar to what you might see in the giant southeast Asian caves. "

Hollis set up rigging on one side and rappelled down into the cave. At about 100 metres below the lip of the cave, he encountered a seven-metre snow cavern, excavated by the thundering white-water river running through the cave. He confirmed that the cave continued on and returned safely to the surface.

The cave entrance is the largest known of the stripe karst kind in Canada. Stripe karst caves form in layers of marble, a highly metamorphosed rock. It may also be the biggest cave in Canada.

CONTINUES ON PAGE 36...

THE HUNT FOR BATTERY MINERALS

British Columbia is well-known for its production and export of copper, gold, silver, lead, zinc, molybdenum, and coal. But unprecedented demand for elements required for battery production, mostly for electric cars, is changing the mining landscape everywhere—and pushing these critical elements into the limelight.

KYLIE WILLIAMS

A global energy storage revolution is underway. Over the next five to 10 years, 29 major automakers will spend at least $300 billion to develop and procure batteries for electric vehicles, according to a January 2019 analysis by the Reuters news organization.

The dramatic increase in consumer demand for electric vehicles is part of a worldwide shift to low-carbon energy generation and green energy technologies. Demand for the raw materials to build the infrastructure and technologies to support this transition is also set to skyrocket. Mineral exploration and mining companies play a key role in locating, developing, and promoting these raw materials, from giant copper and nickel deposits through to niche speciality metal deposits.

Although BC is not—and may never be—a global superpower in the battery metal game, there is an increased push to locate and mine sources of these key metals closer to home. With the dramatic escalation of battery material prices in recent years, many BC-based junior exploration companies are seizing the opportunity to discover and develop speciality metals needed for battery building.

The three main metals currently used in batteries are lithium, nickel, and cobalt. An assortment of other metals and materials are also needed, in varying amounts, depending on the chemistry of the battery and its purpose.

Both cobalt and lithium are currently key components in lithium-ion batteries, currently found in every smartphone, laptop, and electric vehicle. More than half of the world's cobalt supply currently originates in the politically unstable Democratic Republic of the Congo. China is believed to control half of global lithium production through mines in China and ownership of mines elsewhere in Asia and South America.

"The battery industry is rapidly evolving," said Dr. George J. Simandl, P.Geo., critical metal and industrial mineral specialist at the British Columbia Geological Survey (BCGS), "A technology breakthrough may severely alter any medium- or long-term market projections for individual raw battery materials."

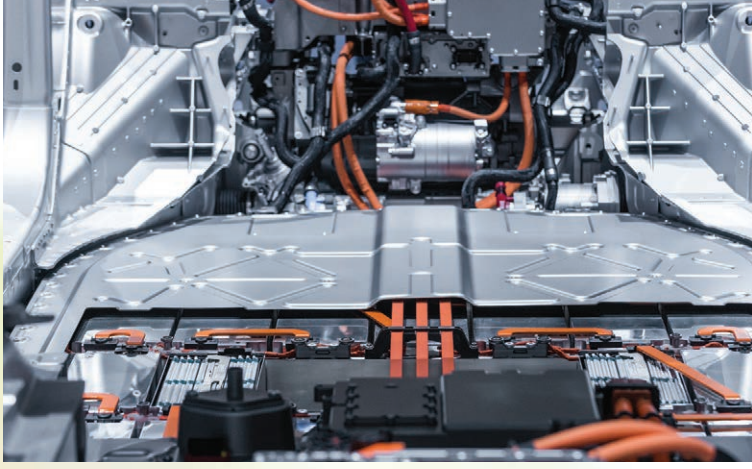
The search for speciality minerals in North America is already changing the way exploration companies market their discoveries, particularly junior explorers developing grassroots projects on a shoestring budget. What might have previously been viewed as a background player in a deposit has become the headline act.

Photo: Smile Fight/Shutterstock.com

At a presentation to Vancouver's Mining Exploration Group in February 2019, Stephen Quin, P.Geo., CEO of BC-based Midas Gold Corp. spoke about the company's flagship, Stibnite Gold Project, in central Idaho, US. He highlighted the presence of antimony in the deposit, an element used in certain batteries, metal compounds and flame-retardant materials. China, said Quin, dominates world antimony production, but the US is eager to develop a domestic source of this critical element. The presence of antimony in an otherwise standard gold deposit now "opens doors" along the onerous path to permitting and development.

The BCGS does not specifically map and track specialty or critical metal exploration projects, but each year the regional geologists report on the mining and exploration projects of all commodity types across the province. The Provincial Overview of Exploration and Mining in British Columbia, 2018, published in January 2019, covers projects active in BC throughout 2018. Several projects are examining deposits of battery materials.

Gordon Clarke, P.Geo., Director of the BCGS Mineral Development Office and lead author on the 2018 report, stated: "An increase in the price for cobalt resulted in a number of cobalt-specific projects being undertaken in the province."



An electric car lithium battery pack with power connections.
PHOTO: SERGII CHERNOV/SHUTTERSTOCK.COM

Examples include Little Gem—a cobalt deposit with a gold by-product—operated by Blackstone Minerals in south-central BC, and Barkerville Gold's Cariboo Gold project, which has cobalt-bearing veins. In southeastern BC, Cardero Resource Corp. encountered evidence of high nickel-cobalt ultramafic rocks in trenches with potential to host mineralization at their Ledgend nickel-cobalt property.

Production of vanadium, the relative newcomer when it comes to battery metals, is also dominated by China. Vanadium is primarily used in steel manufacturing to add strength and corrosion resistance. However, over the past decade, vanadium has increasingly become a sought-after element for the next generation of battery storage technologies. Vanadium redox batteries are particularly well-suited for grid energy storage.

"British Columbia also has excellent exploration potential for crystalline flake graphite deposits and some black (organic-rich) shales contain highly anomalous concentrations of vanadium," said Simandl. In 2018, Lithium Corp. completed trenching in 12 test pits on the BC Sugar property near Vernon, BC, a grassroots-stage graphite property. Some graphite mineralization was observed in three of the trenches.

Paul Cowley, P.Geo., President & CEO of First Vanadium, is also promoting a speciality metal deposit in the US. After a career spent looking for gold, base metals, diamonds, industrial minerals, and coal worldwide, he has set his sights on developing his company's Carlin Vanadium project in Nevada, US.

"I've never been a geologist who followed the fashion metals," said Cowley, "[But vanadium] is pure value and it makes a lot of sense."

The demand for electric and other renewable energy modes is likely here to stay—and so are raw materials required to support them. But Crowley notes that the landscape is still shifting quickly. "It was only two years ago that the [vanadium redox] batteries started to get commercialized," he said. "That's an important step. It has gone from research and development into commercialization. Also, green energy and sustainability have become that much of a stronger mantra for everyone in North America." ◆

WHAT'S IN A NAME?

Metals, minerals, and other raw materials needed for climate-smart technologies, fall in a range of categories, such as battery material, critical metals, strategic metals, specialty metals, and industrial minerals. Some materials fall in multiple categories, based on supply, demand, availability, and importance. Dr. George J. Simandl, P.Geo., critical metal and industrial mineral specialist at the British Columbia Geological Survey (BCGS), explains.

"'Specialty metal' is a catch-all term," said Simandl. "It refers to uncommon, nonferrous metals that are not considered precious metals, and have relatively small world production that is typically less than 150,000 or 200,000 tonnes per year," he says. These materials are used in high-tech applications or as minor alloying agents, such as tantalum, niobium, lithium, beryllium, indium, germanium, cobalt, tungsten, antimony, and certain rare earth elements.

Several battery ingredients are currently considered critical or strategic, based on supply, demand, and concentration of production, as well as current policy priorities. Some jurisdictions, like the US and the European Union, maintain a list of materials which they consider critical or strategic. Mineral commodities on the US's list are vital to US security and economic prosperity, but currently arrive through a limited number of vulnerable foreign supply chains.

"Lists of critical materials change with time due to breakthroughs in technology, political instabilities in producing countries, environmental pressures, and discovery, development, or exhaustion of resources," said Simandl.

Canada does not have a critical minerals list but has excellent geological potential to supply speciality metals worldwide. Simandl and others published a BCGS Open File report in 2012, "Specialty Metals in Canada," that mapped over 1,000 speciality metal-bearing occurrences across Canada. More than 100 were found in BC.

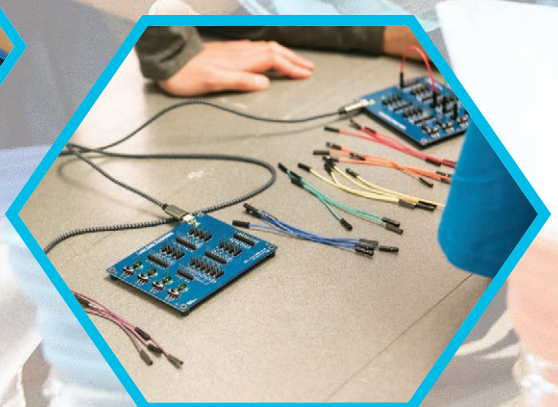
"This compilation is now out-of-date and many of the listed mineral showings and occurrences have been trenched and drilled, and turned into developed prospects," said Simandl, "New mineral occurrences have been discovered and, most importantly, many specialty metals occurring in other geological settings, for example vanadium and others, were not considered in this compilation."

A cluster of vanadinite mineral, part of the apatite group of phosphates and one of the main ores of vanadium.
Photo: Cagla Acikgoz/Shutterstock.com

SCIENCE GAMES 2019

“I didn’t know about permeability before, but now I do.”

—Participant, age 8



Nearly 150 students participated in the 2019 Science Games at the Telus World of Science on Saturday, March 2, 2019. Throughout the day, students demonstrated their problem-solving and teamwork skills, tackling hands-on science activities that featured engineering and geoscience concepts. The popular annual event drew 32 teams—some from as far away as Victoria and Gibsons, BC.

This year, Grade 1 to 3 (Division 1) teams learned about sustainable design, permeability of soils, and different mining methods and how they impact the ground. Grade 4 to 6 (Division 2) teams had to work through a series of electric logic gates to complete several different circuit setups. Division 2 teams also programmed robots and learned about geotechnical engineering.

"The games were the most fun, especially mining for chocolate chips in the cookies using chop sticks and paper clips," said one girl. "I learned that engineers are people who plan buildings to make them safe," said another.

Engineers and Geoscientists BC would like to thank our sponsors, who generously supported the event:
BC Hydro, Fluor, Fortis BC, Hemmera, Klohn Crippen Berger, Lafarge Asphalt Technologies, Lock-Block, and Stantec. The association would also like to thank all the participants, Telus World of Science, and the association members who volunteered their time to conduct and judge the events and serve on the Science Games Steering Committee.

Science Games was one of Engineers and Geoscientists BC's National Engineering and Geoscience Month community events. The association invests in the future of the engineering and geoscience professions, helping tomorrow's geoscientists and engineers get excited about science today. ◆

DIVISION 1 WINNERS

BRONZE: MEMEM
SILVER: Green Leaves
GOLD: 26th Vancouver Brownies Roll
TEAMWORK: Creative Kids
CREATIVITY: NAFTA

DIVISION 2 WINNERS

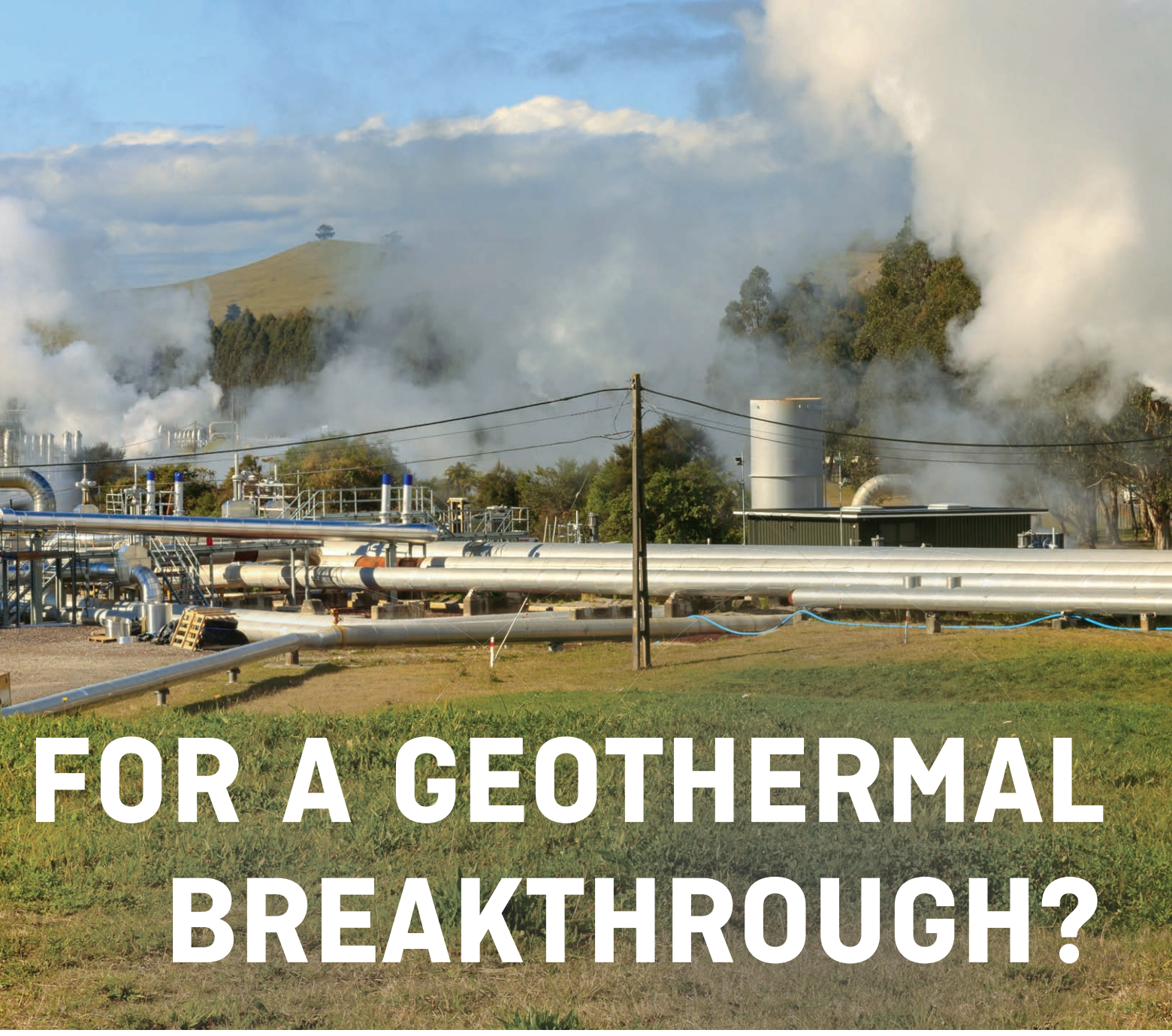
BRONZE: The Earth Shakers
SILVER: Earth Einsteins
GOLD: Science Guides
TEAMWORK: The Dreamworkers
CREATIVITY: Science Guides

IS BC READY

British Columbia possesses great, untapped geothermal resources, but they are generally considered too expensive to access. The Clarke Lake Gas Field near Fort Nelson, however, presents an opportunity to use data from depleted oil and gas wells to develop a new source of heat and electricity, as well as new jobs and greater food security, for a community that sorely needs them.

ROBIN J. MILLER

With many young volcanoes, British Columbia forms part of the Pacific Ring of Fire, the remarkable string of more than 400 volcanoes running some 40,000 kilometres around the edges of the Pacific Ocean, from the southern tip of South America, across the Bering Strait, and all the way down to New Zealand. Roughly 90 percent of all earthquakes occur along this horseshoe, and we are no doubt at risk of a major tremblor here. But we are also sitting on an extraordinary opportunity.



FOR A GEOTHERMAL BREAKTHROUGH?

The Wairakei Power Station is a large geothermal station, located just north of Lake Taupo in New Zealand; it produces 181 megwatts of power. Canada is believed to have thousands of megawatts of potential geothermal energy, but there are presently no geothermal plants in the country.
PHOTO: N.MINTON/SHUTTERSTOCK.COM

"Canada is the only Ring of Fire country to *not* be taking advantage of geothermal power," said Carlos Salas, P.Geo., Chief Scientific Officer of Geoscience BC, a non-profit organization dedicated to providing unbiased data to BC communities, First Nations, and government bodies on resource development in this province. New Zealand, the Philippines, the United States, and Mexico, for example, all have commercial geothermal power plants. "That's a bit crazy, because we are sitting on this fantastic source of heat, just below the earth's surface"—and not just in our

volcanic areas. We also have great, untapped underground heat resources in northeastern BC's deep sedimentary basin and along the major faults, like the Rocky Mountain Trench, that crisscross the province.

The issue is getting to those resources in the first place.

Says Salas, "We've been blessed with lots of cheap, clean power in this province and geothermal, for all its benefits"—which include being long-term sustainable and far more reliable than either solar or wind power—"is expensive, at least at the beginning. It takes money to drill deep, prove the resource and build the plant," which has meant that, historically, geothermal has not been able to compete with the price per watt offered by existing generation facilities, "and no one wants to be involved if there is no market for it."

But what if you can substantially cut the cost of the exploration stage? And what if community economic development, rather than market share, is your motivation?

Over the past four years, Geoscience BC has partnered with BC Hydro to sponsor extensive research into the economic viability of BC's geothermal resources. A 2015 report by BC consulting engineers Kerr Wood Leidal Associates Ltd. and GeothermEx evaluated 18 prospective sites across the province and estimated the project cost and generation potential for the 11 most promising locations. A second report by earth science researchers from the University of Alberta that same year generated a model of one of the most promising sites: the depleted Clarke Lake natural gas field about 14 kilometres southeast of Fort Nelson.

At nearly 60 years old and 26 square kilometres in size, the Clarke Lake field was once one of BC's biggest-producing natural gas fields, and has since provided a wealth of geophysical and geothermal data garnered from decades of drilling hundreds of wells. "It's one of those rare places in geothermal exploration where you have tonnes of information," says Salas. This information effectively erased the need for new, expensive and potentially risky field exploration (exploration usually counts for about 50 percent of the overall development cost for a geothermal plant) by allowing the researchers to determine the characteristics of the reservoir below the wells, simulate hot water production, and predict the electrical power that could be produced there.

A geothermal plant, without the aid of any fossil fuels, uses a deep well to extract hot water—the hotter and the more of it the better—to generate steam and turn an electrical turbine. The cooled water is then injected back into the earth, and the system acts as a closed loop. "The beauty of Clarke Lake," says Salas, "is that there's no need to do hydraulic fracturing to liberate the hot water from the reservoir, and the reservoir we already know is very, very large." It is also just hot enough, at about 110°C, to produce electricity efficiently.

A third study in 2016 by University of Victoria mechanical engineering professor Peter Wild, P.Eng., and PhD student Kevin Palmer-Wilson confirmed the technical viability of a Clarke Lake power plant, and estimated that there is approximately 44.5 megawatts of power available at a cost of about $166 per megawatt-hour over the lifetime of

the plant. While the price is not competitive with other forms of clean power produced here in BC (it is a good price elsewhere), the Fort Nelson First Nation decided they would like to pursue the idea further.

"In a place like Fort Nelson, there are limited wind and solar resources, and hydro opportunities are located a long way away and off grid," says John Ebell. "Right now, Fort Nelson First Nation is 100 percent dependent on a thermal gas-fired electrical grid." A project manager with Nanaimo's Barkley Project Group, Ebell is working with the Fort Nelson First Nation to pursue the possibility of re-purposing the Clarke Lake field as a geothermal development that will not only provide a source of base-load clean electricity to the gas-fired grid, but also make by-product heat available to spur the creation of a range of new commercial enterprises such as greenhouses, forest processing, and spas.

"Fort Nelson's economy is depressed," says Ebell. "Oil and gas has largely left the area. There are people who have had to walk away from their homes. A geothermal plant would mean a lot of professional full-time jobs and help the community remain stable. Developing a viable greenhouse industry could also help with food security."

The First Nelson First Nation has applied to the federal government for help with the next step: a front-end engineering design (FEED) project to develop a detailed design plan, which will include the number of wells and the infrastructure required to produce electricity and heat for Fort Nelson First Nation and the larger Fort Nelson community. Ebell expects the FEED study, if successful, "will then lead to an initial project in the 5-megawatt range."

Fort Nelson First Nation is optimistic that the grant will come through soon, since the federal government recently approved funding for a similar project in southeast Saskatchewan. In addition, the federal and Alberta governments are actively pursuing ways to convert abandoned oil and gas wells near the Rocky Mountain foothills community of Hinton into a geothermal district energy system. If the re-purposing is successful, it may help the province deal with a rapidly growing environmental issue, where cash-strapped oil and gas companies simply walk away rather than cleaning up their sites.

"It's very exciting," says Geoscience BC's Salas, "to think we can go around and re-purpose at least some oil and gas wells, taking a legacy and turning it into something productive."

Even more, says Dr. Catherine Hickson, P.Geo., President of Geothermal Canada, "I think geothermal is on the cusp of becoming a really big thing in BC." Particularly with the $500,000 Geoscience BC has given to exploring the geothermal potential of the Garibaldi Volcanic Belt in 2019, she predicts that "geothermal will soon take its place beside hydro as the two best options to take us to the future. We are going to need more electrons flying through the grid than BC Hydro, even with Site C, will be able to provide in as little as 10 years from now if we want to make the switch to electric cars, buses, and heavy-duty trucks. You can't just flip a switch and have new power sources when you need them. And, geothermal is just a fantastic energy source."

A fantastic energy source, and—because geothermal plants occupy a far smaller physical footprint than hydroelectric dams, gas fields, or even solar or windmill farms—also a way to preserve more of British Columbia's glorious countryside.◆

Engineers and Geoscientists BC's website contains information on the complaint, investigation, and discipline processes. You can contact us at 604.558.6647 or toll-free at 1.888.430.8035 ext. 6647, or by email at complaints@egbc.ca.

DISCIPLINARY NOTICE: HAMID BEHMANESH, P.ENG., WEST VANCOUVER, BC

Engineers and Geoscientists BC issued a Notice of Inquiry to Hamid Behmanesh, P.Eng., in November 2018 regarding engineering services he provided for multiple projects in the Districts of North Vancouver and West Vancouver.

Instead of proceeding to a disciplinary inquiry, Mr. Behmanesh agreed to a Consent Order dated February 21, 2019. In the Consent Order, Mr. Behmanesh admitted that he:

1. failed to ensure that, before November 2015, independent reviews of his designs of single-family residential structures were conducted by members or licensees that had appropriate experience in designing structures of a similar type and scale; or, that he failed to retain the documentation of the independent reviews if they were completed;
2. demonstrated unprofessional conduct, incompetence, or negligence when, in the course of carrying out designs of single family residential structures prior to November 2015, he took responsibility for geotechnical engineering and building envelope engineering when he was not qualified to do so;
3. demonstrated unprofessional conduct, incompetence, or negligence in or around 2016 when, after he had advised the Engineers and Geoscientists BC Practice Review Committee that he was no longer practicing geotechnical engineering or building envelope engineering, he signed and sealed three Letters of Assurance while carrying out designs of single family residential structures, which effectively misrepresented that he is qualified by training or experience in geotechnical engineering and/or building envelope engineering;
4. demonstrated unprofessional conduct, incompetence, or negligence in or around 2016 when he either failed to ensure the completion of documented independent reviews of his structural designs by members or licensees having appropriate experience, and who were not involved in preparing the designs, or failed to retain the documentation; and
5. demonstrated unprofessional conduct, incompetence, or negligence when, between 2014 and 2016, he completed drawings and calculations for multiple projects that contained errors and lacked details and coordination.

In doing so, Mr. Behmanesh admitted that he violated sections 14(b)(1), 14(b)(2), and 14(b)(4) of the association's bylaws and that items 2, 3 and 5 above violate Principles 1, 2 and 3 of the association's Code of Ethics.

As part of the Consent Order, Mr. Behmanesh agreed to the following:

1. From the date of the Consent Order until two years after the date of the Consent Order, Mr. Behmanesh is restricted from providing geotechnical or building envelope engineering services, or from signing or sealing any letters of assurance that include geotechnical engineering and/or building envelope engineering.
2. He will be subject to peer review by a peer reviewer, approved in writing and in advance by the Engineers and Geoscientists BC Registrar. During the period of peer review, Mr. Behmanesh must not sign or seal any reports, drawings, plans, or calculations unless they have been peer reviewed.
3. The peer review will commence on March 1, 2019, and will continue for a period of 12 months.
4. The peer reviewer will report on the performance of Mr. Behmanesh, in writing to the association, every six months during the peer review period.
5. At the conclusion of the 12-month peer review period, the peer reviewer will provide a written opinion to the association's Discipline Committee about whether Mr. Behmanesh requires additional peer review. If so, the peer review will continue for a period of an additional six months.
6. All costs of the peer review process, including the fees of the peer reviewer, shall be paid by Mr. Behmanesh.
7. Within 18 months of February 21, 2019, Mr. Behmanesh must successfully complete the Professional Engineering and Geoscience Practice in BC Online Seminar, the Professional Practice Examination, and the E11 National Building Code (NBC) Part 4 – Structural Design course provided by the Structural Engineers Association of British Columbia.
8. He will pay a fine of $3,000 to the association.
9. He will pay $3,000 towards the association's legal and investigation costs within 30 days of February 21, 2019.
10. If he fails to comply with any of the terms of the Consent Order, his membership in the association will be suspended until every default has been remedied.

The full text of the Consent Order can be found in the Disciplinary Notices section of our website, at *egbc.ca/discipline-notices*.

DISCIPLINARY NOTICE: JAMES W.E. HALAREWICZ, VANCOUVER, BC

Engineers and Geoscientists BC issued separate Notices of Inquiry to James W.E. Halarewicz, P.Eng., in June and July 2018, regarding his unprofessional correspondence to staff at the Architectural Institute of British Columbia (AIBC) and Engineers and Geoscientists BC and, separately, his failure to comply with a practice review for which he was randomly selected.

A disciplinary inquiry was held on August 28 and 29, 2018. Although he was notified of the disciplinary inquiry, Mr. Halarewicz did not attend. A panel of the Discipline Committee (the Panel) heard evidence from witnesses in relation to the allegations set out in the Notices of Inquiry.

On October 11, 2018, the Panel issued its Determination, which stated that the allegations set out in the Notices of Inquiry had been proven. The Panel determined that Mr. Halarewicz contravened sections 30(4) and 44 of the *Engineers and Geoscientists Act* by failing to provide information to the Investigation Committee and by refusing to participate in a practice review. The Panel also found that Mr. Halarewicz's conduct was a marked departure from the standard expected of members and a contravention of Principle 7 |of the Code of Ethics.

Having made its determination, the Panel asked that, by December 21, 2018, the association and Mr. Halarewicz provide written submissions on appropriate sanctions and whether the association's legal costs should be payable by Mr. Halarewicz. Mr. Halarewicz was invited to provide submissions in response to the association's submission on appropriate penalty, but did not do so.

On January 18, 2019, the Panel issued its Determination on Penalty and Costs. In its decision, the Panel considered:

- the nature and gravity of the misconduct;
- prior disciplinary action or character issues;
- the number of times the offending conduct occurred;
- whether the member acknowledged the misconduct and took steps to redress the wrong;
- the need for specific and general deterrence; and
- the need to ensure the public's confidence in the integrity of the profession.

The Panel ordered that Mr. Halarewicz's membership in the association be immediately cancelled, and that Mr. Halarewicz pay $46,455 for the association's legal and related costs.

The full text of the Determination can be found in the Disciplinary Notices section of our website, at *egbc.ca/discipline-notices*.

DISCIPLINARY NOTICE: KARAMJEET (GARY) S. JATANA, P.ENG., SURREY, BC

Engineers and Geoscientists BC issued a Notice of Inquiry to Karamjeet (Gary) S. Jatana, P.Eng., in January 2019 regarding his failure to report unethical behavior of a fellow professional engineer in relation to the signing and sealing of electrical engineering documents. Instead of proceeding to a disciplinary inquiry, Mr. Jatana agreed to a Consent Order dated February 11, 2019.

In the Consent Order, Mr. Jatana admitted he demonstrated unprofessional conduct or negligence by failing to report to the association that Avinder Singh, P.Eng., affixed Mr. Jatana's seal, and forged Mr. Jatana's signature on a Schedule B: Assurance of Professional Design and Commitment for Filed Review in March 2016 for a project related to an industrial property in Surrey, BC. Mr. Jatana admitted his conduct was contrary to Principle 9 of the Code of Ethics, which requires that members of Engineers and Geoscientists BC report to their association or other appropriate agencies any hazardous, illegal or unethical professional decisions or practices by members, licensees, or others.

As part of the Consent Order, Mr. Jatana agreed that, within nine months from the date of the Consent Order, he will:

- undergo a General Practice Review, at his expense;
- complete and pass the Professional Practice Examination; and
- complete the Professional Engineering and Geoscience Practice in BC Online Seminar.

Mr. Jatana also agreed to pay $3,500 towards the association's legal and investigative costs within 30 days of the date of the Consent Order. If Mr. Jatana fails to comply with any of the terms of the Consent Order, his membership with Engineers and Geoscientists BC will be suspended until he does.

The full text of the Consent Order can be found in the Disciplinary Notices section of our website, at *egbc.ca/discipline-notices*.

UNAUTHORIZED PRACTICE AND MISUSE OF TITLE ACTION: ROY JOHAN VAN RYSWYK, SALMON ARM AND REVELSTOKE, BC

Roy Johan Van Ryswyk is a former professional engineer who resigned his membership in 2014. In 2015, the association became aware of materials that bore the likeness of Mr. Van Ryswyk's former professional stamp but were dated after his resignation and return of his professional stamp to the association. The association commenced litigation in the BC Supreme Court and obtained an injunction order on December 23, 2015. The injunction order prohibited Mr. Van Ryswyk from engaging in professional engineering or representing himself as a professional engineer.

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In 2018, the association become aware that over 40 letters of assurance had been submitted to building officials in Salmon Arm and Revelstoke that bore the likeness of Mr. Van Ryswyk's former professional stamp and were dated well after the date of the injunction order. The association filed a contempt of court application that was heard in BC Supreme Court chambers on December 18, 2018.

At the hearing, the association agreed not to pursue committal and Mr. Van Ryswyk agreed to the remaining contempt sanctions sought by the association. The Court granted an order finding Mr. Van Rywsyk in contempt of court for engaging in the practice of professional engineering and representing himself as a professional engineer.

The court order required Mr. Van Ryswyk to notify the persons to whom he provided professional engineering services that he lacked practice rights at the time of providing those services, pay a fine to the Court in the amount of $8,500, and pay the association its costs in the amount of $10,000.

The association and Mr. Van Ryswyk also resolved the litigation that was commenced in 2015, which was outstanding at the time of the contempt application, by way of a consent order dated January 4, 2019. The consent order includes an injunction permanently prohibiting Mr. Van Ryswyk from engaging in professional engineering or representing himself as a professional engineer, and a requirement that he pay the association $10,000 in exemplary damages.

The association takes action to prevent the unauthorized practice and misuse of title by individuals who are not members or licensees of the association. Files are typically opened in response to concerns received from the public or from other public bodies, as well as in response to concerns identified internally by association staff. Although many files are resolved without court action, when necessary, the association takes legal action.

The full text of court orders and settlement agreements relating to many of the association's unauthorized practice and misuse of title files is available on our website, at *egbc.ca/Complaints/Unauthorized-Practice*.

To report unauthorized practice or misuse of title, email *enforcement@egbc.ca*.

REMOVALS FOR NON-PAYMENT OF MEMBERSHIP RENEWAL FEE, 2019

At the direction of the Engineers and Geoscientists BC Council, the following members have been removed from the register and are held in arrears of membership renewal fees for 2019 (Section 21.2, *Engineers and Geoscientists Act,* RSBC 1996, c. 116). To determine whether the member has been reinstated during the year, check the Engineers and Geoscientists BC Membership Directory at *egbc.ca/Member-Directories* or call 604.430.8035, toll-free 1.888.430.8035.

J.A. Abbey
M.M. Abd El-Hakem
L.J. Abrams
M.A. Adam
N.C. Adams
D.L. Afonso
N.K. Agarwal
A.S. Ahmed
F. Akrour
A. Al Noor
Y. Al-Azzam
M. Al-Hawarneh
M.A. Al-Mamun
S. Alhamadani
A. Ali
C.H. Alladin
C.O. Allen
E.N. Allouche
A. Anand Sanghera
G.D. Anderson
D.M. Andrew
S.A. Annan
A.U. Anyadiegwu
N.J. Arena
E.B. Argiloff
P.F. Asante
Z. Ashby
E. Babulak
B.M. Badr
V. Bahrami Yekta
P. Balakrishnan
D. Balazs
K.F. Barnett
K. Barr
C.M. Bassel
G. Bautista
M.N. Bautista
M.S. Baxter
S.J. Bayne
H. Beardmore
D.G. Becker
J.T. Berring
W.E. Bettridge
S. Bhattacharya
R. Bidani
D.C. Biggar
J.M. Bilach
R.J. Blais
E.B. Bluemel
L.S. Blumhagen
A. Boamina Balondona
J.M. Bodnar
G.C. Boisset
A.J. Boissonneault
E. Boozarjomehri
R. Bose
S.F. Bouchard-Desgagné
A. Boudreau
J.C. Bouey
A.C. Bowles
R.E. Brannan
R.W. Bregg
J.W. Broderick
N.S. Bruce
M.J. Bryan
D.C. Buchanan
J.J. Bykewich
A.N. Campbell
T.M. Candrlic
F. Capdeville Perez
F.A. Carrasco Duran
H.G. Carruthers
H.L. Cassel
N.E. Ceron Correa
A.L. Chakraborty
D.Y. Chan
K.T. Chan
Y. Chan
R. Chand
T.A. Chapman
D. Charbonneau
J. Charbonneau
B.W. Chater
A.L. Chaudhary
R. Chauhan
J. Chen
L.C. Chen
S.F. Chen
Z. Chen
C.P. Cheng
M. Chernets
Y. Choi
P.C. Chu
A.T. Chung
G.S. Cicon
H.G. Ciurysek
R.J. Coates
E.E. Cochrane
G.L. Coiner
S.M. Cordick
F. Costa
B.T. Cox
C.W. Crooks
R. D'Angelo
S. Dalo
K.R. Damberger
P. Daoust
M. Debel
B. Dehghani
T.A. Delaney
O.A. Delgado Galeano
J.J. Delisle
D.R. Demontigny
M.S. Dery
S.R. Desai
R.J. Desmarais
S. Despres
K.L. Devine
M. Diaby
A. Domingo
K.D. Doran
J. Drew
H. Du
R.A. Duncan
M.G. Dunham
K.P. Dunleavy
S.P. Durfee
E. Eddington
R.W. Eden
A.G. Edmunds
J.L. Eisel
N. El Ouafi
S. El-Attar
M.S. Elsamahy
J.T. Elsborg
N. Eskandari
C.A. Evancio
D.C. Evans
H.D. Evans
R.D. Evans
J.X. Fan
U.A. Farooqi
R.L. Faulkner
D.R. Fedoration
P. Ferland
J. Fernandez Orjuela
I.A. Finke
A. Fitch
K.D. Forthuber
P.J. Freer
R.G. Friesen
A.J. Froese
C.W. Fuchs
J.A. Fulthorpe
S.C. Fulton
T.W. Gallivan
A. Gandha
F. Gao
M. Gao
Y. Gao
B.W. Garrett
B. Garvey
M. Ghadiri Dehkordi
M. Gholamreza-Kashi
D.R. Gibb
A.P. Gibbs
G.S. Gill
P.C. Gillham
H.J. Girard
A.J. Girdner
E. Giron Maglioni
L. Gobeil
S. Gomez Munoz
B.D. Goodchild
L.D. Goodhue
N.E. Goodings
B.K. Gorain
L. Gotz
J.D. Graham
D.L. Gravelle
T.H. Greaves
M. Greenhill
G.B. Greenlees
J.A. Greig
H.S. Grewal
R.Y. Gritten
H. Guo
P. Gurung
A. Habib
N. Hacohen
M. Hadayat
R.K. Haeske
P. Hage-Moussa
J. Hajinasiri
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M.F. Hall
T. Hallab
A.H. Hammad
F. Hammadi
M. Hamzah
K.P. Han
B.J. Hansen
A. Haque
C. Hardman
P.J. Harrison
S.M. Harrison
C. Hayek
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E.K. Helmers
G.T. Henderson
M.W. Henn
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A. Herath
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M.W. Hitch
G.L. Hodgson
T.G. Hoffman
C.J. Holley
N. Holowaty
A.R. Honarpisheh
S.Y. Hong
M.D. Horner
P. Houde
S. Huang
W.E. Hubbard
J.F. Humeny
B.J. Humphrys
S. Hussain
A. Ijaz
M. Imbeault
S.J. Irg
R.A. Isaac
P.A. Jackson
S.F. Jacobs
D. Jagger
F. Jamali
S. Javadi
M. Javeed
Q. Jiang
B. Jodat
B.J. Joe
E.J. Johnson
W.M. Johnston
H. Julien
S. Kar
K.G. Kasteel
T. Katramadakis
M. Kaur
T.M. Keast
A.J. Keklikian
J.A. Kemp
S.C. Keng
M. Khalid
M. Khera
M. Khondker
C. Klassen
K. Koellner
I.G. Kolevski
E.M. Koss
A. Koutsandreas
A.J. Kovacs
K.F. Kruse
N.V. Kulkarni
A. Kumar
B.C. Kung
J.A. Kushneryk
W.B. Kussro
D. Kwak
J.W. Kwan
C. Kwatara
D.T. Lai

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F.C. Lee
G. Lee
R.G. Lee
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F.J. Lenarduzzi
J. Leu
A.F. Leung
C.J. Levie
R.T. Levy-Booth
Y. Li
K.J. Little
F. Liu
W. Liu
W. Liu
X.M. Liu
H.F. Livermore
R.W. Loi
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R.D. Merer
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K.W. Miller
M. Minhas
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M.M. Mohamed
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A.D. Moret
A.M. Morhart
M. Morshedian
Y.M. Moser Granadillo
H. Moslehi Jenabian
M. Movassaghi
W. Mugo
A. Munsch
T.D. Murphy
W. Murray
S.M. Murshed
N. Mushtaq
L.A. Nahrgang
S. Nazari
J.E. Neill
J.D. Nelson
N.H. Neufeld
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M.M. Nofal
K.L. Norris
Z.K. Nurani
W.J. O'Grady
G.G. O'Neil
J.J. O'Rourke
E.B. O'Shea
M.A. Olsthoorn
A. Omar
J.D. Ottens
J.J. Ouellet
M. Ouellet
M.S. Oweis
G.S. Pahwa
M. Paknahad
K. Palko
A.S. Pall
J. Pannu
B.C. Pao
M.B. Parlange
E.U. Pasha
B.V. Patel
S.B. Patel
D.T. Paul
C. Paunescu
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Z. Peng
A.A. Pereira
K.J. Peters
C.D. Pflueger
J.A. Phemister
R.J. Philip
Y. Phillips
R.M. Picard
M. Piche
J.F. Pickell
A.C. Pickett
G. Pieszko
A.A. Pineda
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Y.S. Poon
A.A. Popoola
D.A. Povolo
D.J. Pratt
J.D. Pumple
M.D. Pye
S.P. Quin
V.K. Rajpurohit
J.J. Ramesch
B. Rancourt
H. Rathod
S.K. Rathore
P. Rattigan
G. Raynard
R.V. Rea
A.A. Read
A.C. Reid
D. Rhodes
P. Richard
N.J. Richardson
S.B. Ridgway
H.R. Rimrott
E. Rivard
M.E. Roberts-Seymour
A.R. Rodriguez Angel
G.A. Rogers
D. Ropchan
D.A. Rose
N.K. Rosin
S.G. Rothman
J.H. Rutherford
N. Sadeghi Malvajerdi
S. Saiedi
A. Salam
A.Y. Salkin
T. Samouh
I.H. Sanchez
S.S. Sangha
Y. Santos
G.J. Saunders
R.W. Schmudde
S.A. Schram
C.E. Schwartz
K.J. Scott
P. Seisan
S.S. Sett
A.A. Shah
K.M. Shah
S.A. Shehata
V. Shmatalyuk
S.N. Siddique
D.J. Simard
H. Singh
M. Singh
K.A. Slough
S.A. Smith
F.W. Snihur
A. Soni
B.C. Stahl
G.P. Steeves
C.L. Stefan
R. Stefanovic
A.S. Stephen
C.J. Stephenson
J.G. Stieben
R.A. Stranges
H. Sukardi
D.E. Sweeney
S.R. Switzer
Z. Syed
J.H. Tam
R.K. Tam
R.N. Tamayo
D. Tamblyn
L.P. Tang
A.S. Tarigan
M. Tavakolikhaledi
C.M. Taylor-Hell
S. Temirov
M. Tetreault-Friend
C.S. Tham
P.K. Thota
C.L. Time
T.J. Tipton
D.E. Torhjelm
M.B. Tran
D.J. Treppo
P.A. Truch
P.C. Trujillo Padilla
S.M. Twitchell
S.R. Uecke
R.E. Unny
W.L. Vaile
A.P. van den Camp
A. Van Roodselaar
F. Vasefy
K.C. Vidal
R.J. Visser
D.M. Wali
J.J. Walker
D.M. Wallis
L.P. Walsh
T.H. Wan
K. Wang
K. Wang
Y. Wang
Y.W. Wang
Z. Wang
Z.K. Wang
D.G. Wardberg
M.J. Warner
A.J. Warren
T.P. Warren
J.T. Weddle
V.C. Wei
M.I. Weigley
J.P. Weinberger
B.R. Weiss
J.J. Werner
C.R. Wheeler
A.B. Whittles
A.M. Wiecke
R.H. Williamson
G.S. Willick
D.T. Wolanski
K.L. Wong
N. Wong
T.M. Wong
D.V. Woods
A. Wu
B. Xu
H. Yang
F. Yao
T.G. Yau
J.H. Yee
Z. Yi
N. Yoon
A. Yuen
W. Yuen
Y.H. Yusuf
B.N. Zaccaria
R. Zawadzki
F. Zemicael
J. Zhang
X. Zhang
Y.G. Zhang
H. Zhao
W. Zhao
B. Ziegler
L. Zou
C. Zuberec ◆

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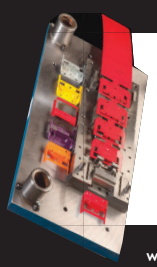
"How far? How deep? What kind of caverns? There is no way of knowing until somebody actually goes down there," said Hickson.

Hollis and Pollack have applied for a three-year permit to explore the cave further. They have assembled a group of specialist vertical alpine cavers, including members of the Alberta/British Columbia Cave Rescue Service, who set the depth record at the Bisaro Anima cave near Fernie, BC, in 2018. Hickson and colleague Peter Lewis, P.Geo., make up the geology team.

"We have three world-class geological features within the park," said Hickson. "We have Helmcken Falls, a 141-metre-high waterfall in the southern part of the park, a gorgeous, pristine, relatively young 2,000-year-old cinder cone called Kostal Cone, and then we have the cave. What I'm



trying to do is build the cave into this trilogy of geological gems of Wells Gray. At some point, we'll be trying for World Heritage status again, but not quite sure when."

For Pollack, this is a real-life, do-no-harm adventure story. Although the cave entrance was mapped as a sinkhole in the 1980s, and there is indigenous knowledge of the cave, he is excited that new-to-science discoveries of this magnitude are still available in North America. Three people have contacted him to report similar features in other places since the cave made national and international headlines in November and December last year. Two of the caves had been identified previously but one could potentially be another gem hiding in plain sight. Pollack is hoping the Wells Gray cave continues to inspire people to look for new discoveries.

The Wells Gray cave is a reminder that there are still geological gems in inaccessible places in this vast province. For now, Hickson, Pollack, and the team will continue to map out the geology and geometry of the sleeping giant in northern Wells Gray Provincial Park until the next exciting revelation. ◆

ORGANIZATIONAL QUALITY MANAGEMENT PROGRAM

The following organizations have recently received OQM certification. To find out more, visit *egbc.ca/oqm*.

Enginuity Consulting
Finning (Canada) Power Systems Engineering
Focal Engineering Inc.
Isherwood Geostructural Engineers, Brian Isherwood & Associates Ltd.
M3 Mechanical Consultants Inc.
MFPE Engineering Ltd.
Pel Engineering Ltd.
Quantum Engineering Ltd.
Ron Wong & Assoc. Inc.
SNC-Lavalin Inc. - Clean Power
T.G.I. Engineering & Design Concepts Ltd.

MEMBERSHIP

IN MEMORIAM

The association announces with regret the passing of the following members:

M.G. Baker, P.Eng.
B.R. Barnewall, P.Eng.
E.J. Bremner, P.Eng., FEC, FGC (Hon.)
A.A. Brown, P.Eng. (Non-Practising)
C.L. Connaghan, P.Eng.
R.A. Cox, P.Eng.
P. deWolf, P.Eng.
M.A. Durand, P.Eng.
J.R.N. Graham, P.Eng. (Non-Practising)
H.R. Grant, P.Eng.
B.M. Ho, EIT
T.W. Johnson, P.Eng.
R.W. Jones, P.Eng. (Non-Practising)
J. Klimes, P.Eng.
M.R. Larson, P.Eng.
S.P. Lawn, P.Eng.
S.F. Leaming, P.Eng.
P.D. Lester, P.Eng.
G.F. MacFarlane, P.Eng.
A.J. McGill, P.Eng.
J.R. Murdoch, P.Eng.
P.J. Olynyk, P.Eng.
H.J. Page, P.Eng.
S.M. Pasha, P.Eng.
A. Schulhof, P.Eng.
E.H. Stinson, P.Eng.
W.K. Stockdale, P.Eng. (Non-Practising)
R.E. Stromberg, P.Eng. (Non-Practising)
H. Uchida, P.Eng. (Non-Practising)
O. Voute, P.Eng. (Non-Practising)
R.A. Wallach, P.Eng.
J.W. Warr, P.Eng. (Non-Practising)
P.H. Wiecke, P.Eng. (Non-Practising)
J.G. Wong, P.Eng.
C.E. Woodruff, P.Eng. (Non-Practising)◆

INNOVATION

AD INDEX MARCH/APRIL 2019

CONTINUING PROFESSIONAL DEVELOPMENT

PERSONAL INVESTMENT. PROFESSIONAL COMMITMENT.

BECOMING A HIGHLY EFFECTIVE NEGOTIATOR

April 8, 2019 – Vancouver, BC

In both our professional and personal lives, we don't get what we deserve, we get what we negotiate. We all know that it is the give and take of negotiations that allows problems to be solved, decisions to be made, and needs to be satisfied, but we also all encounter people that have no intention of bargaining in good faith. Come learn a proven method that is not designed to win over your opponent, but rather to win your opponent over.

VANCOUVER BUILDING BYLAW: PLUMBING, MECHANICAL AND ENERGY CODE UPDATES

April 9, 2019 – Vancouver, BC or Webinar

Plumbing, mechanical and energy code updates in the City of Vancouver will be discussed. Topics include "operating permits", non-potable water systems, building water treatment systems, Legionella, cooling towers and evaporative condensers, decorative water features, single pass systems, including once through cooling, and new plumbing fixture and appliance requirements. Energy efficiency changes coming into effect on June 3, 2019, will also be reviewed, and potential next steps in implementing the Zero Emissions Building Plan will be shared.

MICROSOFT PROJECT TRAINING FOR ENGINEERS AND GEOSCIENTISTS

April 9 and 10, 2019 – Vancouver, BC

You will participate in various hands-on exercises and develop confidence in creating and managing single as well as multiple projects. It will provide you with the skills to effectively track and analyze projects with a better understanding of the schedule and impact of changes.

APPLIED SOIL MECHANICS AND SHORING DESIGN

April 10 to 12, 2019 – Vancouver, BC

This course provides practical training on shoring design, reviews the related soil mechanics knowledge, and demonstrates how to apply soil mechanics theory to actual and practical shoring design, as well as the equations and loads that are derived for shoring design. Design methods will be covered for different earth supporting systems, including sheet pile, braced cut, tieback anchor, and soil nailing.

HYDRO GENERATOR STABILITY AND CONTROL SYSTEMS ESSENTIALS FOR ENGINEERS

April 11, 2019 – Vancouver, BC

This seminar explains the key factors regarding application and operation of control systems for hydro generators. Specifically, the seminar will focus on stability, frequency control, voltage control, and coordination of protection with control. The seminar is reinforced with practical examples of real world problems and solutions.

TUNNELLING: PLANNING, DESIGN, AND CONSTRUCTION

April 15 and 16, 2019 – Vancouver, BC

This course considers plan, design, and construction control of mechanized tunnelling in urban environments. Course topics will cover: tunnelling in urban environments and related challenges, risk management and mitigation, field explorations, geotechnical baseline report, tunnel alignment selection, TBM types and selection, support systems and design methods, settlement prediction and control, tunnel construction control, case histories, and numerical simulation of tunnelling using software.

SUSTAINABLE RAINWATER MANAGEMENT THROUGH GREEN INFRASTRUCTURE

April 18, 2019 – Vancouver, BC or Webinar

Green infrastructure (GI) is an umbrella term for infrastructure that delivers benefits to urban development through the ecosystem services that natural systems provide. The session will cover geotechnical requirements, sizing methodology, recommended design details, and the importance of soil specifications and planting design to project success. An overview of other GI tools, such as green roofs and rainwater harvesting, and considerations for how they are implemented in a Vancouver context will be presented.

BUILDERS LIEN ACT

April 24, 2019 – Vancouver, BC or Webinar

This seminar will offer a concise, up-to-date overview of builders' liens, including a discussion on the obligations on design consultants with respect to payment certification and release of holdbacks, and practical tips to manage the risks.

SOIL-STRUCTURE INTERACTION – A PRACTICAL APPROACH

April 25 and 26, 2019 – Vancouver, BC

The objective of this course is to provide engineers with the fundamental concepts of soil-structure interaction, with special emphasis on practical earthquake engineering applications. The course introduces seismology and the basic concepts of soil dynamics prior to tackle soil-structure interaction. The application of static and dynamic "seismic" cases is illustrated through numerical examples and examples from the literature.

URBAN WATERSHED PLANNING

April 30, 2019 – Vancouver, BC

This seminar provides participants with a comprehensive understanding of methods that can be employed to describe watershed hydrology and the infrastructure required to mitigate the impacts imposed upon streams in an urban environment while allowing development within the watershed.

BUSINESS WEALTH ACCUMULATING STRATEGIES

April 30, 2019 – Vancouver, BC or Webinar

This workshop is intended for incorporated professional looking to smart and tax-effective strategies accumulate savings and wealth inside their business. This workshop will offer insight into important information surrounding wealth accumulation and estate maximization for business owners.

APPLICATIONS OF MACHINE LEARNING IN SENSING

May 1, 2019 – Burnaby, BC

The aim of this session is to provide you with the basic understanding of techniques that can be used to improve the quality of data collected by sensors or to gain additional knowledge from sensors.

MICROSOFT EXCEL EXPERT TRAINING FOR ENGINEERS AND GEOSCIENTISTS

May 1, 2019 – Vancouver, BC

Learn to manage data through databases and pivot tables which will simplify complex reporting and tracking requirements for projects. Learn advanced functions and tools like Goal Seek and creating scenarios useful for providing variations on quotes. This course maps to the Microsoft MOS Expert Exam.

TECHNICAL WRITING: SOLUTIONS FOR EFFECTIVE WRITTEN COMMUNICATION

May 2, 2019 – Vancouver, BC

May 28, 2019 – Victoria, BC

This seminar provides practical, applicable solutions and techniques for how to express your thoughts succinctly in written format. Through a series of hands-on workshops, you will learn to write effective emails, technical memos, letters, reports, and other documents. Whether you are a junior employee or a seasoned professional in your technical field, this seminar will help you to improve your technical writing skills.

For a complete listing of events or for more information, visit *egbc.ca/Events/Seminars* or contact us at 604.430.8035 or 1.888.430.8035.

CALL FOR PRESENTERS

Are you an expert in your field who would like to contribute to engineering and geoscience practice?

Engineers and Geoscientists BC is actively seeking members to present on a variety of topics. For more information, please visit *egbc.ca/Events/Seminars*.

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