

ENGINEERS AND GEOSCIENTISTS BRITISH COLUMBIA

MARCH/APRIL 2021

INNOVATION

ON THE TRAIL OF A HAZARDS CASCADE

**NATIONAL INSTRUMENT
43-101 TURNS 20**

**DATA SLUETHS
UNCOVER BC'S
HIDDEN RICHES**

**WHAT YOU NEED TO
KNOW ABOUT THE
PROFESSIONAL
GOVERNANCE ACT**

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ON THE COVER

A screenshot from a Hakai Institute video of the November 8, 2020, landslide near Bute Inlet hints at the hazard's devastation.

PHOTO: GRANT CALLEGARI/HAKAI INSTITUTE.

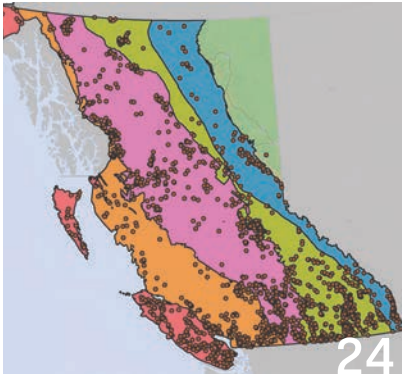
COVER STORY

ON THE TRAIL OF A HAZARDS CASCADE

A November 8 landslide, first detected by seismologists, sent a swath of trees, mud, and rocks cascading into Bute Inlet, finally coming to rest after tumbling 65 kilometres. The violent and catastrophic potential of landslides like these—and their shifting causes and impacts—are getting plenty of attention from BC experts, four of whom weigh in on a hazard that could have been much worse.



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DATA SLEUTHS UNCOVER BC'S HIDDEN RICHES

Collating data from 12,270 National Instrument 43-101 Technical Reports into a single, public database sounds useful, but is full of challenges. Purple Rock's Nicole Barlow, P.Geo., and James Barlow, P.Eng., got moral and funding support from Geoscience BC, giving new life to Property File and MINFILE databases.

NATIONAL INSTRUMENT 43-101 TURNS 20

One of the toughest and most-respected disclosure rules for mineral projects has just turned 20 years old. And although it's still considered in some circles to be the ideal disclosure Instrument, some experts are suggesting that more education and guidance could serve to help those who author them.



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THE DIGITAL EDITION OF *INNOVATION* INCLUDES VIDEO EXTRAS. TO ACCESS, SCAN THIS QR CODE FROM ANY MOBILE DEVICE, OR GO TO EGBC.CA/INNOVATION. IN THE DIGITAL EDITION, CLICK ON THE PLAY BUTTON TO VIEW CONTENT.



ENGINEERS & GEOSCIENTISTS
BRITISH COLUMBIA



ETHICS WILL ALWAYS BE THE CORNERSTONE OF OUR WORK

On February 5, 2021, the new *Professional Governance Act* (PGA) came into force, representing a shift in the regulation of engineering and geoscience in BC. To support this new legislation, Council passed a new set of Bylaws to bring Engineers and Geoscientists BC into compliance with the *Act*. The implementation of this *Act* is the culmination of countless hours and focus by staff, volunteers, and Council for over two years.

Hopefully, you will have heard the following statement many times, but it's still important: this *Act* improves Engineers and Geoscientists BC's regulatory abilities, and also introduces some key changes individual registrants need to be aware of. I encourage you to review the webpage dedicated to PGA education, at egbc.ca/pga. There are also some free webinars you can download and watch if you didn't have the chance to participate when they were first offered.

Part of what's new under the PGA is a revised Code of Ethics. While the changes to our previous code were modest, it nonetheless reminds us that ethics is a critical part of our professional work. A code of ethics is at the core of what it means to be a professional. The public expects, and demands, ethical behaviour from professionals. As we have seen in many industries—including our own—changes in the regulatory landscape are often a result of events that caused harm to the public or environment or a loss of public trust and subsequently encouraged government to act in response.

In this issue, there is a story about National Instrument 43-101 and its importance as a standard for mineral resource disclosures. This instrument was created in the wake of the Bre-X mining fraud of approximately 25 years ago.

While having a Code of Ethics alone does not of itself ensure avoidance of public harm, it is one of the most important commitments any professional can make to their work. The public—and by extension, our government and lawmakers—expect us to commit to and observe very high ethical standards.

Recent polls of public opinion reinforce that the engineering and geoscience professions are respected and trusted. Adherence to our revised Code of Ethics can only improve a public perception of which we can all be proud.

Larry Spence, P.Eng., President

president@egbc.ca

INNOVATION

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Letters to the editor containing your views on topics of interest are encouraged. Opinions expressed in letters are not necessarily endorsed by Engineers and Geoscientists BC. Letters should be 300 words or less and can be emailed to innovation@egbc.ca. Find information at egbc.ca/Submitting-to-Innovation.

IMMUNOCOMPROMISED REGISTRANT QUESTIONS HARDCOPY DRAWINGS REQUIREMENTS

As an immunocompromised individual, I spent two weeks in quarantine in March 2020 and, in the summer of 2020, I decided to begin work as a sole proprietor. I have continued to work throughout this pandemic; I have assisted with emergency residential restoration projects and mentoring across the Lower Mainland. I see my duty as an engineer as having important societal benefits, and I am honoured and grateful for the skills and knowledge this profession has given me.

An Authority Having Jurisdiction recently confirmed via email that although they are accepting digitally submitted drawings, they will ultimately request hardcopy drawings. This request

originates out of personal preference of many plan reviewers to work with paper. At the bottom of the email response was a stock note in bold and red font that requests for a reduction of in-person visits to City Hall.

Engineers and Geoscientists BC has published practice guidelines, webinars, and a website FAQ regarding the Use of Seal and digitally certified technology. I wish to remind employees and jurisdictions to consider evolving their policies to permit certified digital submissions in lieu of paper transmittal.

David Mark James Budd, P.Eng.

REGISTRANT PREFERS LIFE MEMBERSHIP STATUS

I agree with Derwyn Lea's comments [*Innovation*, January-February 2021]

concerning the fees presently being paid by non-practicing retired professional engineers. I paid my association dues for 40 years with the understanding that one day I would qualify for Life Membership status. The decision to cancel the historical Life Membership qualification status with zero fees seems to me to be somewhat unfair and arbitrary.

I also believe that long-serving engineers should be encouraged to continue to pass on valuable knowledge after retirement, especially to up-and-coming engineers (through mentorships, workshops etc.). But the restrictions placed on non-practising engineers seems to me to discourage any ongoing involvement of retirees in our noble profession.

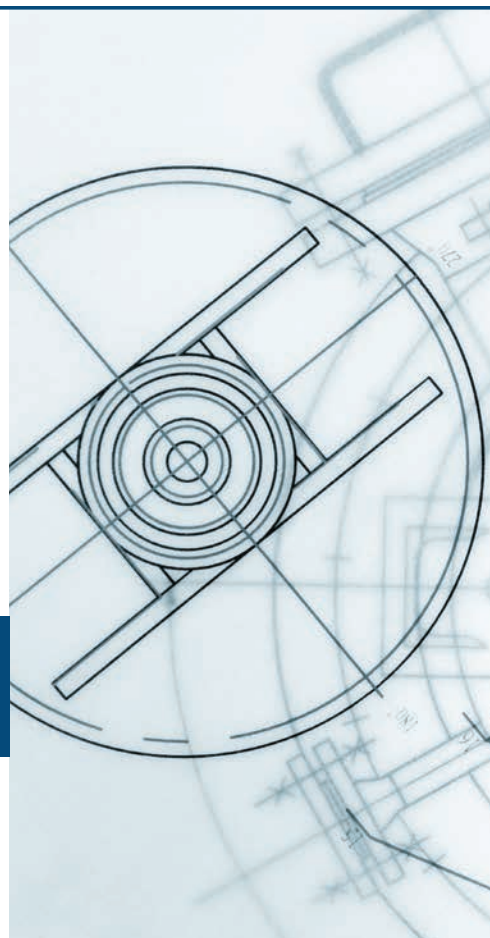
Paul E. Marmion, P.Eng. (Retired)

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FEBRUARY 5, 2021

Engineers and Geoscientists BC's Council of elected members and government representatives meets throughout the year to conduct the business of the organization's governance. The following are the highlights of its February 5, 2021 meeting.

TRANSITION TO THE PROFESSIONAL GOVERNANCE ACT

Council received an update on the organization's transition to the *Professional Governance Act*, which came into force on February 5, 2021. Engineers and Geoscientists BC is well-positioned to support this change, with all major initiatives either complete or on track for completion. The *Professional Governance Act* introduces new obligations and requirements for Engineers and Geoscientists BC and its registrants that will be implemented over the coming months. Council also received confirmation that the Engineers and Geoscientists BC Bylaws, which set out the specific standards, requirements, processes,

and procedures that apply to Engineers and Geoscientists BC and its registrants, were approved by the Office of the Superintendent of Professional Governance. For more information on the PGA and changes that will impact registrants, visit egbc.ca/pga.

TERRITORIAL ACKNOWLEDGMENT POLICY

Council approved a policy for including territorial acknowledgments at organizational events. Providing a territorial acknowledgement for a given First Nation is a deliberate acknowledgement that that Nation has had a relationship since time immemorial with the land we are standing on. It is a sign of respect and recognition, and a small step in promoting awareness to support reconciliation with Indigenous peoples in British Columbia.

Although the organization has regularly included territorial acknowledgments in many events for several years, the policy will provide for a consistent application of this respectful recognition and raise awareness of the ongoing efforts of Truth and Reconciliation.

LICENSING AND REGISTRATION INITIATIVES

Council received updates on a series of initiatives supporting internationally trained professionals and competency reporting for future registrants.

- The Professional Placement Pilot Project, which aims to improve access to relevant employment for underemployed or unemployed internationally trained professionals, is preparing to enter its next phase following a delay due to the COVID-19 pandemic. Current efforts are focused on identifying potential P.Eng. candidates and employers interested in participating.
- The Pan-Canadian Competency-Based Assessment of Engineering Experience project, funded by Engineers Canada, is nearing completion. This project aims to make BC's competency-based assessment system (CBA) available to all interested Canadian regulators. Currently, six of the ten regulators in Canada who evaluate engineering experience have either adopted or committed to adopt this system and two regulators have adopted major elements of the competency framework.
- Geoscience CBA, the equivalent system for geoscience applicants, was successfully launched on November 1, 2020. Additional experience assessors have been trained in order to support the increased number of applications, and recruitment is underway for additional assessors in key practice areas. Several other Canadian engineering and geoscience regulators are also in the process of implementing Geoscience CBA for their own geoscience applicants using Engineers and Geoscientists BC's system.

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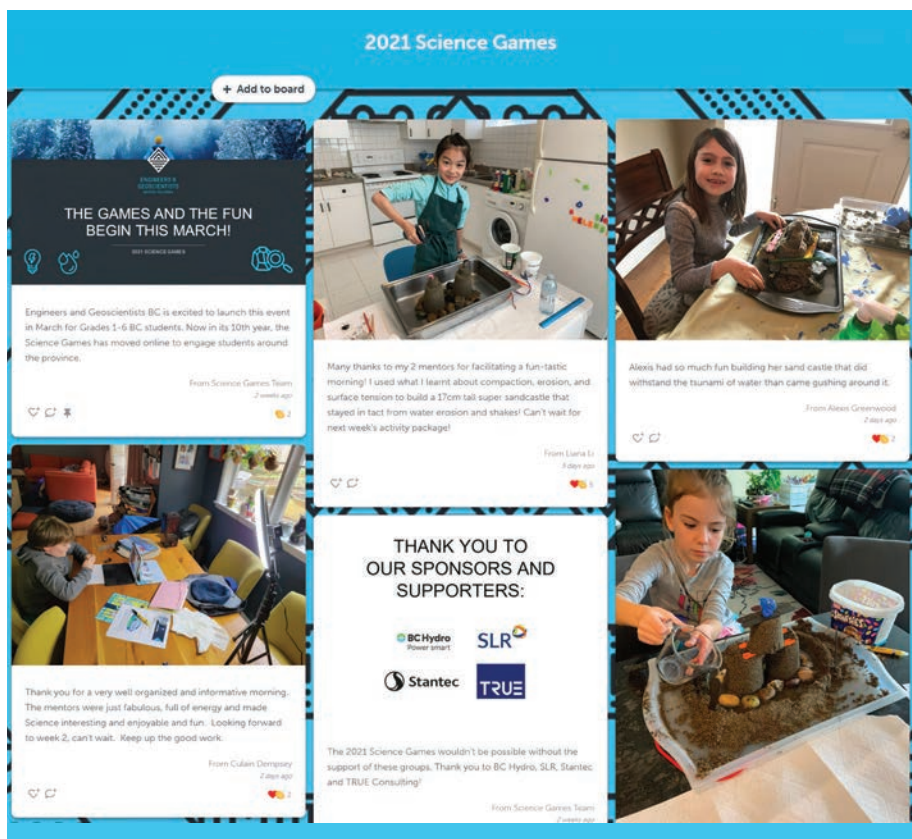
NATIONAL ENGINEERING AND GEOSCIENCE MONTH CELEBRATES THE PROFESSIONS' CONTRIBUTIONS TO PUBLIC SAFETY

In March, Engineers and Geoscientists BC celebrated National Engineering and Geoscience Month (NEGM) with students and professionals across the province. To recognize this important event and highlight how engineers and geoscientists enhance public safety and improve life in British Columbia, Engineers and Geoscientists BC hosted several events for individuals and families across the province, including the launch of a video podcast and the return of the annual Science Games competition.

The podcast, *In Conversation: Engineering and Geoscience in BC*, featured a dynamic discussion between science journalist Bob McDonald, host of CBC Radio's award-winning *Quirks & Quarks*, and two recipients of the 2020 Engineers and Geoscientists BC President's Awards, Dr. Loretta Li, P.Eng., and Dr. Dan Moore, P.Geo. Topics ranged from Dr. Li and Dr. Moore's innovative work to their inspirations, career challenges, and thoughts on what engineers and geoscientists are doing to keep the public safe.

If you have not listened to the podcast yet, you can watch the video on our YouTube channel by going to youtube.com and searching "Engineers and Geoscientists BC", or listen to the audio version by searching "In Conversation: Engineering and Geoscience in BC" on Spotify (open.spotify.com) or Apple Podcasts (podcasts.apple.com).

In addition to the podcast, Engineers and Geoscientists BC celebrated NEGM with students at the annual Science Games competition. Returning for its 10th year in a new virtual format, Science Games gave students in Grades 1 through 6 the




Virtual Science Games 2021

opportunity to explore the principles and theories of science while providing an engaging environment to grow their confidence and abilities. And, the Richmond-Delta branch is holding a Virtual Bridge Building Competition on





April 23, which is open to anyone that is able to deliver their built bridge to the Richmond Public Library. To learn more or to register, visit egbc.ca/events.

For more information about NEGM, visit egbc.ca/negm.



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What's changed under the new legislation?



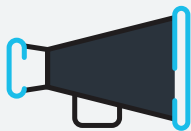
Updated Bylaws. The new legislation is implemented through updated Bylaws, recently approved by the Office of the Superintendent of Professional Governance. egbc.ca/Act



Updated Code of Ethics. Engineers and Geoscientists BC's Code of Ethics has been revised to reflect the requirements of the new legislation. egbc.ca/Code-of-Ethics



Mandatory Continuing Education. Practising registrants will be required to complete 60 hours of continuing education within a 3-year rolling window, beginning July 1, 2021. egbc.ca/Continuing-Education



Updated Information. Registrants are required to update their contact information, area/industry of practice, or employer changes, on their Engineers and Geoscientists BC account at egbc.ca/Account, within 30 days of a change.



Regulation of Firms. Engineering and geoscience firms in BC will become regulated, and must register with Engineers and Geoscientists BC for a Permit to Practice, beginning July 2, 2021. egbc.ca/Firms



Learn More. Visit egbc.ca/pga for our video, *Innovation* insert, FAQs, and webinars (both future and past) on continuing education, firm regulation, the updated Code of Ethics, and more.

THE PROFESSIONAL GOVERNANCE ACT IS NOW IN FORCE. HERE'S WHAT'S NEW.

On Friday, February 5, the *Professional Governance Act* (PGA) came into force. This new legislation replaces the *Engineers and Geoscientists Act* and establishes a consolidated framework for professional regulators in the natural and built environment, including Engineers and Geoscientists BC and the regulators for forestry, agrology, biology, and applied science. Architecture is also expected to be brought under the PGA in 2022.

This change means registrants have new obligations they need to be aware of, and new requirements to follow.

What's changing?

Updated Bylaws

The PGA introduces new regulatory tools, processes, and requirements for Engineers and Geoscientists BC and its registrants. These requirements are formalized through an updated set of Engineers and Geoscientists BC Bylaws. Both the PGA and the updated Engineers and Geoscientists BC Bylaws are available at egbc.ca/act.

Updated Code of Ethics

The Code of Ethics has been updated to align with mandatory ethical principles contained in the PGA. The changes are modest and generally consistent with our previous Code of Ethics but new principles have been introduced that registrants should be aware of. Our recorded webinar titled "Understanding the New Code of Ethics", and the updated Code of Ethics itself, are available at egbc.ca/Code-of-Ethics. A detailed Guide to the Code of Ethics will be published in early March.

Mandatory Continuing Education

The PGA makes specific amounts of Continuing Education a requirement,

beginning July 1, 2021. Practising registrants will be required to complete 60 hours of continuing education (including one hour each of ethical and regulatory training) within a three-year rolling window. Learn more about how to prepare to meet these requirements, through the new Guide to the Continuing Education Program, and a recording of our February 10 webinar. Both the new guide and the webinar are available at egbc.ca/Continuing-Education.

Requirement to Keep Your Information Updated

Registrants will need to verify their area of practice annually and keep their information up to date. The first information reporting deadline is June 30, 2021. Effective immediately, registrants must also now update their account within 30 days if their contact information, area/industry of practice, or employer changes.

Firms will become Regulated

Engineering and geoscience firms will become regulated, bringing BC in line with the rest of Canada. All firms that engage in the practice of professional engineering or geoscience as part of their operations (including firms that only provide these services internally) will be required to register with Engineers and Geoscientists BC for a Permit to Practice. Applications open July 2, 2021 and firms will need to apply by September 30, 2021. For more information, and a link to a recording of the Regulation of Firms webinar, visit egbc.ca/firms.

Additional Changes

- The designations for engineering and geoscience licensees (Eng.L. and Geo.L.) have been updated to

Professional Licensee Engineering (P.L.Eng.) and Professional Licensee Geoscience (P.L.Geo.).

- The existing Practice Review program will be separated into two distinct processes: a proactive Audit program (beginning July 2022) that measures compliance with Engineers and Geoscientists BC requirements, and a reactive Practice Review program, triggered when significant issues are identified during an Audit or as the result of a complaint.
- Registrants' public profiles in the Registrant Directory will now display more detailed information, such as each registrant's licence number, declared discipline, designation, discipline history, and any practice restrictions.

Future Changes

Work is still underway on a few key policy items, including the consideration of practice rights for three groups under the PGA: engineering technologists, biologists, and agrologists. The Office of the Superintendent of Professional Governance (OSPG)—the oversight body for the PGA and regulators under this legislation—has confirmed that, at this

time, the current structure will remain in place. Engineers, geoscientists, and foresters will retain practice rights, while agrologists, biologists, and technologists will maintain title rights.

The OSPG intends to begin a process with Engineers and Geoscientists BC and the Applied Science Technologists and Technicians of BC to discuss the opportunities and challenges associated with, and potential approaches to, reserved practice within the engineering discipline for technologists and technicians. Engineers and Geoscientists BC supports the principle of providing opportunities for qualified technologists to practice independently; that is the goal of our Professional Licensee designation, which currently provides practice rights for technologists within a defined scope. However, given the breadth and complexity of engineering practice, any changes to the way in which practice rights are regulated can carry potential risk. As an organization, we are committed to participating fully in a process that provides opportunities to qualified engineering technologists while keeping public protection paramount. As this process is carried out, we will keep registrants up to date.

RESOURCES

We've developed a number of resources to help registrants understand their new obligations and requirements under the PGA. Visit egbc.ca/pga for our video, *Innovation* insert, FAQs, and webinars (both future and past) on continuing education, firm regulation, the updated Code of Ethics, and more.

While this change represents a shift in how the professions of engineering and geoscience are regulated, our purpose remains the same: to protect the public. The regulatory tools under the PGA will improve public safety and confidence in the engineering and geoscience professions, ultimately resulting in stronger regulation and a safer British Columbia.

UPDATES TO OUR TERMINOLOGY

In addition to introducing new obligations and requirements, the *Professional Governance Act* (PGA) also introduces several changes to the terminology for the organization and its registrants. To support consistency between the PGA and the organization's operations, and to ensure clarity in our communications, Engineers and Geoscientists BC has adopted the terminology in the PGA and reflected this in its Bylaws and throughout our other communication channels.

BEFORE	NOW
Member	Registrant
Member-in-Training (EITs and GITs)	Trainee (EITs and GITs)
Continuing Professional Development Hours	Continuing Education Hours
Practice Review*	Audit
Limited Licensee (Eng.L and Geo.L)	Professional Licensee (P.L.Eng. and P.L.Geo.)
Sealing a document	Authenticating a document
Stamp	Seal

*The term *Practice Review* will continue to be used, but now refers to a new process: a technical review that can be triggered as the result of a complaint.



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UPDATED DESIGNATIONS FOR ENGINEERING AND GEOSCIENCE LICENSEES

Engineers and Geoscientists BC has confirmed a change to the title of limited licensees (Eng.L., Geo.L.). The designation of Engineering Licensee (Eng.L.) is now Professional Licensee Engineering (P.L.Eng.), and Geoscience Licensee (Geo.L.) is now Professional Licensee Geoscience (P.L.Geo.).

Limited Licensee designations (Eng.L., Geo.L.) were introduced in the mid-1990s to provide an alternative pathway to professional licensure for those with significant work experience, but without the requisite four-year bachelor's degree in applied science, engineering, or geoscience.

Over the last several years, there were opportunities to study and address feedback that the registrant category "limited licensee" does not accurately reflect the experience, professionalism, and competency of licensees. Following stakeholder consultation, it was recommended the designation be updated in line with the introduction of the *Professional Governance Act* and updated Bylaws.

DO YOU QUALIFY FOR A FELLOWSHIP FROM ENGINEERS CANADA OR GEOSCIENTISTS CANADA?

Engineers Canada and Geoscientists Canada both grant fellowships to individuals as recognition of their significant contributions to their respective professions.

Both the Engineers Canada Fellowships and the Geoscientists Canada Fellowship are given to individuals on the basis of specific criteria. For both fellowships, individuals may qualify if they provided noteworthy service, or have served as a volunteer for the engineering or geoscience professions for at least 10 years. For both fellowships, length of service can combine with board or committee service with Engineers Canada or Geoscientists Canada, or volunteer work for the organizations' constituent organizations (e.g., Engineers and Geoscientists BC, APEGA, etc.).

Nominations for these fellowships must be made by constituent organizations. For more information about

fellowships and the criteria for eligibility, and how you can apply or nominate someone, visit our website. This year, Fellowship submissions must be received by April 9, 2021.

Engineers Canada and Geoscientists Canada fellows receive a certificate and a pin, and are given the privilege to use the fellowship designation (i.e.; "Fellow of Engineers Canada – FEC" "Honorary Engineers Canada Fellow – FEC (Hon.)", "Fellow of Geoscientists Canada – FGC" or "Honorary Geoscientists Canada Fellow – FGC (Hon.)"

To view lists of those who have already received fellowships, visit www.engineerscanada.ca/awards-and-honours/fellowships/fellowship-recipients and www.geoscientistscanada.ca/about/awards-fellowships.

COMMUNITY

BC ENGINEER AND RENOWNED FUEL CELL RESEARCHER APPOINTED TO ORDER OF CANADA

Dr. David P. Wilkinson, P.Eng., Chemical and Biological Engineering Professor and Canadian Research Chair in Clean Energy and Electrochemical Technologies (Tier 1), was appointed to the Order of Canada in late 2020 for his contributions to electrochemical science and engineering, particularly his work on the development of fuel cell technology.

Dr. Wilkinson—who received Engineers and Geoscientists BC's R. A. McLachlan Memorial award in 2001—has made notable contributions in electrochemistry, electro-chemical engineering, and battery and fuel cell technology. Dr. Wilkinson has 80 patents and has authored over 225 refereed publications, co-authored one book, edited six books, and authored eight book chapters. Thomson Reuters named him as one of the world's most highly cited global researchers.

Created in 1967, the Order of Canada is one of our country's highest and most prestigious honours; it recognizes outstanding merit or distinguished service from Canadians from a range of fields. More than 7,000 people from all sectors of society have been invested into the Order of Canada. Other Order of Canada appointments along with Dr. Wilkinson include figure skater Tessa Virtue, actor and comedian Dave Thomas, and former politician Allan Rock.



PHOTO: BRUCE MARCHFELDER, UBC FACULTY OF APPLIED SCIENCE



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QUALITY MANAGEMENT GUIDES NOW AVAILABLE

The Professional Governance Act requires Engineers and Geoscientists BC to establish standards of practice, conduct, and competence that all registrants must comply with. These standards are established in Engineers and Geoscientists BC's Bylaws (found at egbc.ca/Act).

To support registrants in understanding the standards of practice, conduct and competence, Engineers and Geoscientists BC publishes Quality Management Guides (found at egbc.ca/Quality-Management-Guides). These guides explain the standards for quality management in professional activities and are based on the former Quality Management Guidelines. The guides address the following topics.

- Documented field reviews during implementation or construction.
- Retention of project documentation.
- Authentication of documents.
- Use of Professional Practice Guidelines.

These requirements carry forward previous obligations that were in place under the *Engineers and Geoscientists Act*; however, two new guides are introduced to clarify requirements that were previously embedded in other guidelines. The two new guides are related to the use of professional practice guidelines and independent reviews of high-risk professional activities or work.

The standard for the use of Professional Practice Guidelines requires Engineers and Geoscientists BC to publish and update professional practice guidelines as necessary, and requires registrants to be aware of and follow any guidelines in place relevant to their area of practice. In addition, registrants must document in writing any reason for departing from the established standard of practice within a guideline. More information can be found in the *Guide to the Standard for*

the Use of Professional Practice Guidelines (version 1.0, February 17, 2021).

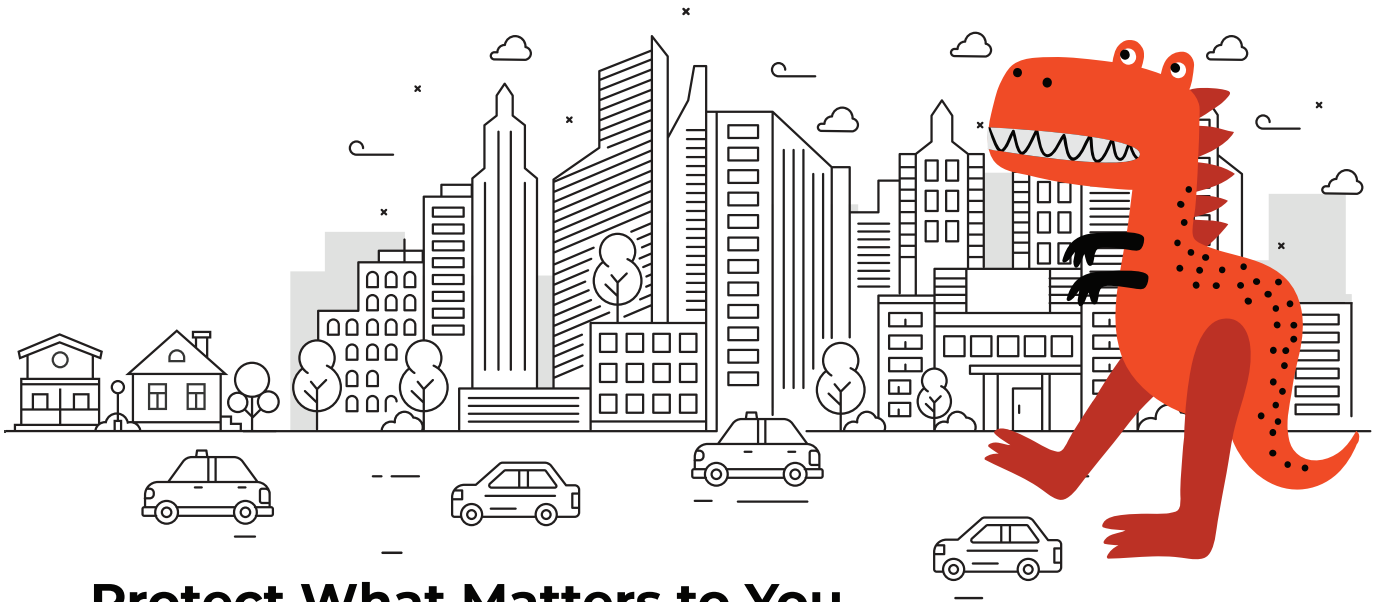
The standard for independent review(s) of high-risk professional activities or work formalizes the existing requirement for registrants to use a risk-based approach to documented checks. Under this standard, a professional activity or work that has been identified by a Professional of Record as high-risk through a documented risk assessment must undergo a documented independent review(s) before the professional activity or work is submitted to those who will be relying on it. *The Guide to the Standard for Independent Review(s) of High-Risk Professional Activities or Work* is currently under development and will be presented to Council at its April meeting prior to publication. Detailed information on this standard can currently be found in Bylaw 7.3.6.

The Quality Management Guides can be found on the Practice Resources section of our website, at egbc.ca/Quality-Management-Guides.

Questions about standards of practice can be directed to practiceadvisor@egbc.ca.

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NEW CLIMATE CHANGE ACTION PLAN TO SUPPORT REGISTRANT PRACTICE

Engineers and Geoscientists BC published its Climate Change Action Plan, the first plan of its kind created by an engineering or geoscience regulatory body in Canada, available at egbc.ca/Climate-Change. The Action Plan provides strategic direction for the organization, outlining how Engineers and Geoscientists BC will respond to climate change and support its registrants to proactively consider climate change into their professional practice.

The Action Plan was developed by Engineers and Geoscientists BC's Climate Action Plan Steering Group, with the support of climate action consultants, and after a robust consultation with registrants and industry stakeholders.

The Action Plan was approved by Council in November 2020.

CLIMATE CHANGE ACTION PLAN GOALS

The Action Plan defines two complementary goals that articulate Engineers and Geoscientists BC's role with respect to climate change. These are:

1. supporting the effective assessment and management of climate risk in the practice of professional engineering and geoscience in BC; and
2. supporting registrants to develop and implement solutions to reduce greenhouse gas emissions.

The key means by which Engineers and Geoscientists BC will advance its

climate goals are outlined in ten actions. These actions provide guidance on how Engineers and Geoscientists BC can support professional engineers and geoscientists to incorporate climate change principles into their practice, while delivering on their primary duty and responsibility under the *Professional Governance Act* to protect the public interest.

IMPLEMENTING THE CLIMATE CHANGE ACTION PLAN

The Action Plan builds on Engineers and Geoscientists BC's previous work, including leading and supporting many initiatives to address climate change in engineering and geoscience practice. Engineers and Geoscientists



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BC's current Climate Change Information Portal—a dedicated space for climate change resources (egbc.ca/Climate-Portal) to be updated as the Action Plan is implemented. Engineers and Geoscientists BC will continue to assess progress towards the Action Plan goals by engaging regularly with registrants to ensure they are receiving adequate

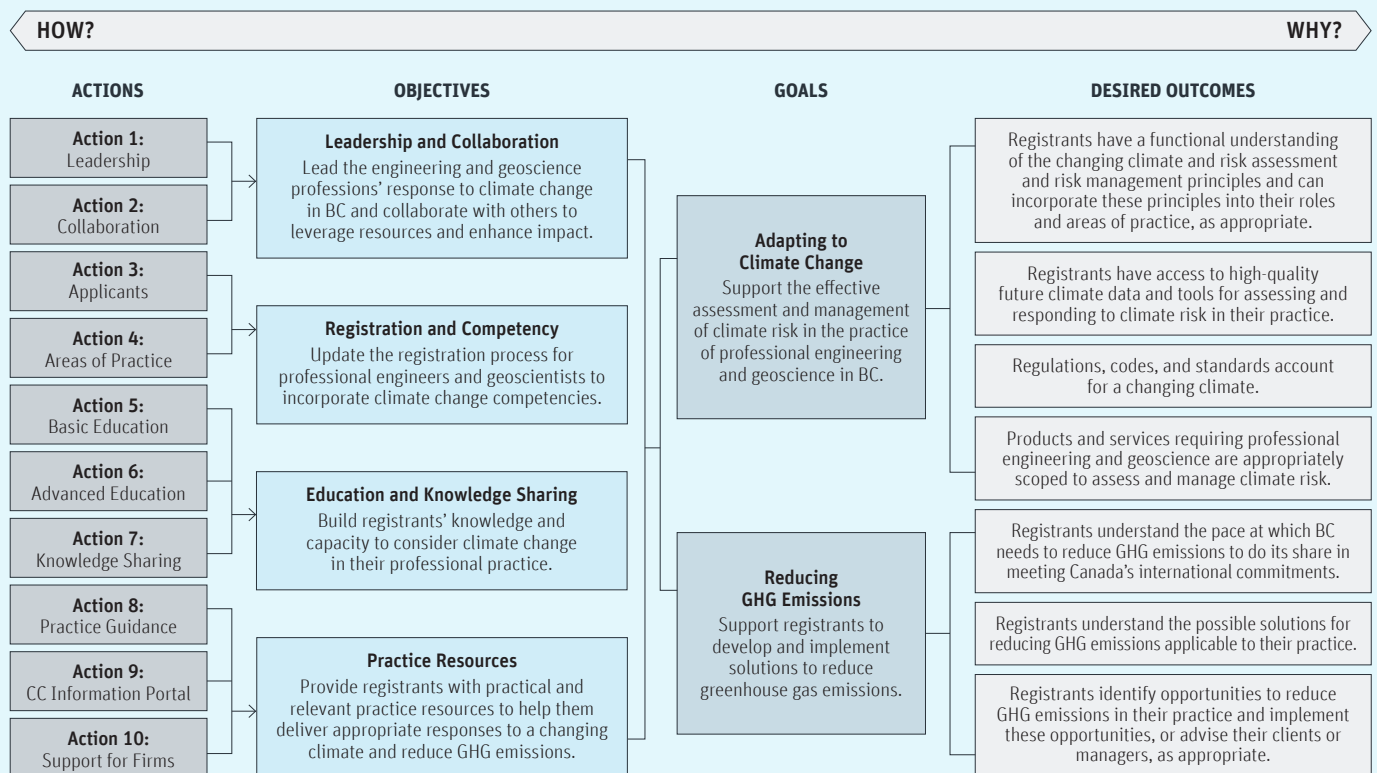
support and to evaluate progress on an annual basis. The Action Plan will be reviewed and updated in three years.

MORE INFORMATION

With the release of the Action Plan, there are many opportunities for registrants to get involved to help shape its implementation. Registrants interested in sharing their knowledge on climate action

or who have specific ideas or questions relating to climate action can contact the Engineers and Geoscientists BC Climate Change Advisory group at ccag@egbc.ca.

Registrant resources, including the Climate Change Information Portal, the consultation summary report, and the Climate Change Action Plan itself, are available at egbc.ca/Climate-Change.



Note: "GHG" = greenhouse gas "CC" = climate change

Climate Change Action Plan Structure and Overview:
Actions, Objectives, Goals, and Desired Outcomes.



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FEATURE

ON THE TRAIL OF A **HAZARDS CASCADE**

A REMOTE LANDSLIDE SETS OFF A 65-KILOMETRE
CHAIN OF EVENTS AND EXPOSES BC'S
VULNERABILITY TO NATURAL HAZARDS

Monique Keiran



The Bute Inlet/Elliott Lake
landslide from November 28, 2020,
on a Hakai Institute helicopter.
PHOTO: KATRINA PYNE/HAKAI INSTITUTE

At 6:53 AM on November 28, 2020, 18 million cubic metres of rock broke loose from a mountain near British Columbia's Bute Inlet and thundered into Elliot Lake.

The resulting 100-metre-high wave swept over the glacial lake's moraine dam and charged down the nearby creek. It scoured the valley bottom, uprooted trees, and sent a slurry of boulders, mud, and timber into the Southgate River valley.

"There's evidence it temporarily dammed the Southgate," says Dr. Marten Geertsema, P.Geo., an adjunct professor at the University of Northern BC who has studied landslides in BC since the 1980s. "When it released, a large sediment plume hit the inlet. Over the following weeks, those sediments were traced in currents at the bottom of Bute Inlet and Discovery Passage up to 65 kilometres away."

"It's not the first lake tsunami that's happened in BC," Geertsema says, "but it was spectacular one."

IF A SLOPE FALLS DOWN A MOUNTAIN, AND NOBODY SEES IT...

No one witnessed the Elliot Lake landslide or the ensuing chain of events. But seismographs across North America detected the seismic signature of a large landslide. This alerted Geertsema and his colleagues that something big had happened somewhere along BC's coast. It wasn't until a helicopter pilot flew up Bute Inlet in mid-December that the slide was located.

"We dodged a bullet," says Dr. John Clague, P.Geo., FGC, FEC (Hon.). "Elliot Creek is pretty remote, but there are forestry operations in the valley below. As far as we know, nobody was there when this happened."

As it is, a forestry road was swept away. Of particular concern to local First Nations, the debris flow

destroyed this year's salmon hatch in the creek and lower river.

An international team of 70 scientists is now investigating the events of November 28. The researchers seek to determine the conditions that led up to the slide and if weather in the preceding weeks triggered the slide. They'll look into how the retreat of the glacier below the slope contributed and assess long-term effects on Elliot Creek, Southgate River and Bute Inlet. They'll also try to determine whether the slope is likely to fail again.

"It will be a well-studied landslide," says Dr. Brent Ward, P.Geo., FGC, FEC (Hon.), co-director of the Centre for Natural Hazards Research at Simon Fraser University. "That kind of cascading hazard is pretty unique, where you have a landslide, a tsunami, then a debris flood, then sediments going out to the delta, and a large turbidite that then flows underwater for kilometres. It's a big deal."

LANDSLIDES COME WITH THE TERRITORY

British Columbia's topography and geology make landslides inevitable.

Landslides are complicated, complex, and varied geological events. The factors that precondition a slope to fail and the triggers that set a slope in motion are diverse and complex, and how they combine and interact makes each slide unique.

For example, precipitation can cause flooding, which can undercut a slope or a riverbank, which can set up a landslide. It can percolate into rock or sediments and trigger a landslide by increasing the pore water pressure within the slope, or it can freeze in cracks, causing rockfalls. It can also leach the salt out of layers of clays buried deep underground, altering the

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PHOTO: GRANT CALLEGARI/HAKAI INSTITUTE

chemistry that binds and strengthens clay and making it unstable.

Yet precipitation is just one condition influencing a slope.

“Just one of those conditions adds complexity to the terrain,” Clague says. “Add more, and they start interacting in very complex combinations of ways.”

In addition, the underlying conditions that predispose slopes to fail vary from valley to valley, slope to slope, and across slopes. They also vary year to year, week to week, and day to day, depending on weather, melting snow or ice, seismic or hydrothermal activity, and other local factors.

And, as the Elliot Lake event shows, landslides can set in motion other natural hazards. A rockslide can trigger a debris flow if it incorporates enough water, for example, from snow or ice. A landslide can dam a river or trigger a lake tsunami, which each can cause a flood or debris flow. Many combinations of hazards are possible.

CLIMATE CHANGE: A NEW LANDSLIDE PARADIGM

According to Ward, changing climate set the stage for the Elliot Lake hazard cascade.

“Warming climate caused the glacier below the slide to retreat during the last few decades,” he says. “Before, there would have been no lake. The landslide would have hit the glacier, it would have travelled some way down and stopped. The impact would have been local.”

That the glacier had pulled back enough that the slide hit its edge, then the

lake, is a problem, he says. “One of the biggest areas of concern geoscientists have about natural hazards these days is the effects climate change is having on landslides. We just don't know what kind of a new world we're moving into.”

University of Northern BC professor and glaciologist Dr. Brian Menounos, P.Geo., and colleagues recently



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assessed the change in mass of all glaciers in western North America outside of Alaska. “We found that, from 2009 to 2018, the rate of mass loss of the glaciers increased four-fold over that of 2000 to 2009,” he says.

That has implications for slopes surrounding glaciers. When glaciers erode mountain valleys, they stress and fracture the valley walls and support them too, so when the glaciers melt, thin, and retreat, that buttressing support disappears.

“Studies in Europe have shown that when you get deglaciation, you often get an increase in [debuted-slope] landslides,” Menounos says. “Depending on the presence of lakes at the foot of the glaciers, if they’re close to steep slopes, the risk of cascading events like what happened at Elliot Lake increases. If the retreating glaciers don’t produce lakes, landslides could still happen but the chances of having outburst floods would decrease.”

The province’s high-altitude permafrost is also thawing. Mountain permafrost occurs in soils and bedrock, where it also takes the form of the ice in the cracks and crevices between the rocks that holds them together.

“Sometimes it involves water percolation or widening of fractures in the rock,” Geertsema says. “With rock glaciers, where you have rock masses with interstitial ice, you can get creep developing, and sometimes

that over-steepens the slope.” When bedrock permafrost degrades or melts, “the bedrock can become unstable, making rockfalls and rock avalanches more likely.”

A study by Geertsema and colleagues from the U.S. Geological Survey revealed that more frequent and larger rock avalanches in Glacier Bay National Park, Alaska, were linked to melting mountain permafrost. Of three clusters of landslide activity that occurred in the region between 1984 and 2018, the 2012 to 2018 cluster consisted of more and larger rock avalanches that originated higher on the slopes and travelled further. The scientists identified the loss of permafrost as a key contributor to the slides.

Changes to weather patterns comprise a third dimension of climate change effects on landslides. Prolonged and heavy rainfall drives and triggers landslides. Under climate change, the hotter, drier summers and more frequent, more intense rainstorms predicted for BC would abet glacier retreat, act on slopes’ vulnerability to changes in groundwater pressure, and increase erosion—all of which could in turn promote slope failures.

In addition, Geertsema says, “One of the things we’re looking at in BC is how wildfires impact slope stability. We can have more and more intense wildfires as a result of climate change, and wildfires can also lead to debris flows.”

“It’s difficult to predict landslides generally anyways,” Ward says, “but with climate change, we just don’t know how the



PHOTO: KATRINA PYNE/HAKAI INSTITUTE



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² Statistics Canada, "Household spending, Canada, regions and provinces," November 25, 2019.

³ CMHC, "Mortgage and Consumer Credit Trends National Report – Q4 2019," December 2019.

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landscape is going to respond to the new precipitation and warming regimes.”

GETTING A HANDLE ON BC'S LANDSLIDE HAZARDS AND RISKS

Landslides are almost impossible to predict across the broader landscape, but it is possible to identify areas at greatest risk and to monitor the most hazardous slopes.

“If you have limited public funds for reducing risk from landslides,

how are you going to spend them?” Clague says. “What are you going to worry about? What are you going to hive off to the private sector?”

British Columbians have been lucky, he says. “Most of the big slides in the last century have happened in remote areas, away from communities and infrastructure. But it’s an ongoing concern, and as communities grow

and spread out and up mountain slopes, the risks increase.”

Inventorying and monitoring efforts in BC have tended to focus on slopes that put communities and infrastructure at risk, but new projects include inventorying and modelling slopes above lakes or fjords where landslides could cause tsunamis. Geoscientists are also



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J. SUZANNE POWELL, Ph.D., P.Eng.

Suzanne joined Thurber in 2009 and has focused primarily on land development and transportation infrastructure projects. Her professional interests include advanced laboratory testing, and quality management. In 2017, she was promoted to Branch Manager of the Victoria office and was named an Associate. Suzanne completed both her B.Sc. (2002) and Ph.D. (2010) in Geological Engineering at Queen's University. Suzanne is a current board member for several professional organizations, including the Association of Consulting Engineering Companies British Columbia (ACEC-BC), the Victoria Civic Heritage Trust and the Canadian Foundation for Geotechnique.

WARREN R. WUNDERLICK, B.A.Sc., P.Eng.

Warren joined Thurber in June 2004 in Toronto and moved to the Victoria office in June 2006. Warren has provided geotechnical engineering for major transportation projects across Canada, including highway grading designs and bridge structures, with a focus on steep terrain and rock slopes. Warren graduated with a bachelor's degree in Geological Engineering from the University of British Columbia in 2005 and registered as a Professional Engineer in the Province of British Columbia in 2009.



LIZA PACKER, B.A.Sc., P.Eng.

Liza joined Thurber at the Vancouver office in 2004. Since then, Liza has been involved in a wide range of geotechnical projects, including shoring and excavation design, municipal infrastructure, and foundation engineering. Liza's primary focus is on land developments, including retaining wall design, infrastructure, and excavations. Liza completed her undergraduate degree in Civil Engineering at the University of British Columbia in 2004.

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looking at landslides associated with permafrost and glacial retreat.

Baseline data is key, Menounos says. “We don’t know when these events are going to happen, but in order to gauge how big these events are and what their consequences might be, we need baseline information on the terrain.”

That means drawing on remote-sensing technologies.

“Lidar has revolutionized hazards research,” Menounos says, “because, in the case of steep, forested slopes, you acquire not just the characteristics of the trees but you also get shots from the laser that are hitting the ground beneath the canopy and around the trees. You can use that data to produce surface models without the trees on them.”

Geoscientists are also using data from satellite-based InSAR (interferometric synthetic aperture radar), which detects millimetre-scale changes in the position of an object on the Earth’s surface and collects information about entire regions all at once.

“The technology allows you to survey entire slopes or watersheds for these needles in a haystack,” Clague says. “If a slope is deforming, InSAR will allow you to pick out the hotspots where the slope is creeping downwards.”

Having baseline data means geoscientists can track changes in terrain or glacial ice mass. When combined with machine learning and other emerging technologies, the data allow geoscientists to identify high-risk slopes quickly, and monitor and even predict failures on those slopes. [Innovation, September/October 2020, Page 29.] The datasets also allow geoscientists to retroactively assess how a slope that collapsed changed in the days and months before it failed—something that the geoscientists studying the Elliot Lake slide are already doing.

CONTINUES ON PAGE 37...

A SELECTION OF NOTABLE BC LANDSLIDES

HOPE, JANUARY 9, 1965

Early on January 9, 1965, a snow avalanche is thought to have brought three vehicles to a stop on Highway 3 below Johnson Ridge, about 15 kilometres southeast of the town of Hope. “The Hope slide is one of those areas with steep slopes and weak rock,” says Dr. Brent Ward, P.Geo., FGC, FEC (Hon.). “In hindsight, it was probably prone to failure.” Four people died.



Debris field on the south side of Highway 3
PHOTO: BC MINISTRY OF TRANSPORTATION

TERRACE-AREA, DECEMBER 2020

A November shallow-slope landslide swept away about 165 m of track and brought rail traffic between Terrace and Kitimat to a standstill for months. The landslide was a sensitive-clay slide, similar to the December 30, 2020 landslide that tore through a community in Norway. There, 10 people died and more than 1,000 people were evacuated.

MOUNT MEAGER, AUGUST 6, 2010

There are so many steep slopes in BC that could produce landslides, not all can be monitored in detail. But Mount Meager gets special attention. On August 6, after weeks of heatwave temperatures across BC’s south coast, Mount Meager’s southern 2,550-metre peak collapsed in a series of rockfalls onto the saturated, weak southern slope, destabilizing it. The resulting debris avalanche briefly dammed both waterways and forced the temporary evacuation of nearly 1,500 people from Pemberton due to the threat of flooding. Nobody was injured in the event, although four people barely escaped being caught in the debris flow.



The Mount Meager landslide in 2010 was one of largest in Canadian history, but led to no fatalities.
PHOTO: D.B. STEERS

JOHNSON’S LANDING DEBRIS FLOW, JULY 12, 2012

At 10:37 AM on July 12, the saturated slope above the community of Johnsons Landing released. Some 320,000 cubic metres of glacial till, soil, rock and water hurtled 2,300 metres down Gar Creek towards Kootenay Lake, at times reaching speeds of 150 kilometres per hour. Where the creekbed turned sharply, half of the debris flow followed the channel and the other half kept going, ski-jumping a 30-metre ridge to find its own way downhill. The debris slammed into homes, destroying four and damaging 16 others, and took out three sections of the local highway. Four people died.

DATA SLEUTHS UNCOVER BC'S HIDDEN RICHES

British Columbia is the first province in Canada to create and share a database of geolocated National Instrument 43-101 technical reports, extracting years of valuable mineral exploration work carried out by professional geoscientists and making it easier to find and use.

Kylie Williams



The location of the projects described in National Instrument 43-101s filed to 2019. The extracted data can be viewed in a Graphical Information System (GIS) platform, such as Geoscience BC's Earth Science Viewer or the BC Geological Survey's MapPlace portal.

PHOTO: PURPLE ROCK

British Columbia hosts a wealth of valuable mineral deposits. We have found and developed many of these, but the province's geology suggests that hundreds may lie waiting to be uncovered. Useful clues to help find valuable mineral deposits are hidden in historical records and reports on work carried out in the recent past. Since gold was first discovered in BC in 1858, prospectors and geologists have scoured the province, recording their observations and interpretations in battered field notebooks splattered with squished mosquitoes and drill logs splashed with mud and rain.

Over time, these notebooks, together with hand-drawn maps, telegrams, microfiche, and compact discs, have found their way into boxes, gathering dust in homes, offices, and storerooms. As prospectors and geoscientists retire, or companies change focus or close, these records make their way to the BC Geological Survey (BCGS) to be scanned, indexed, and added to the public Property File document database that they maintain and make available through their MapPlace portal.

Digging through historical geology records pays dividends. In 2004, BC prospector Ed Balon, P.Geo. (Retired), uncovered an outcrop of gold mineralization in the Spences Bridge Belt between Princeton and Lillooet in south-central BC. The discovery resulted from years of searching through historical literature and surfing the various databases maintained by the BCGS, together with boots-on-the-ground prospecting. Balon's persistence paid off, and led to the discovery of bonanza-grade gold in 2018. Today, the Spences Bridge area is buzzing with new exploration activity.

Balon's story is just one example of many discoveries made using public geoscience data in BC. This data's availability

is incredibly valuable to the province as it competes for exploration dollars that could be spent in other resource-rich exploration and mining jurisdictions worldwide. Providing a buffet of publicly available and easily searchable data attracts exploration activity and investment to the province.

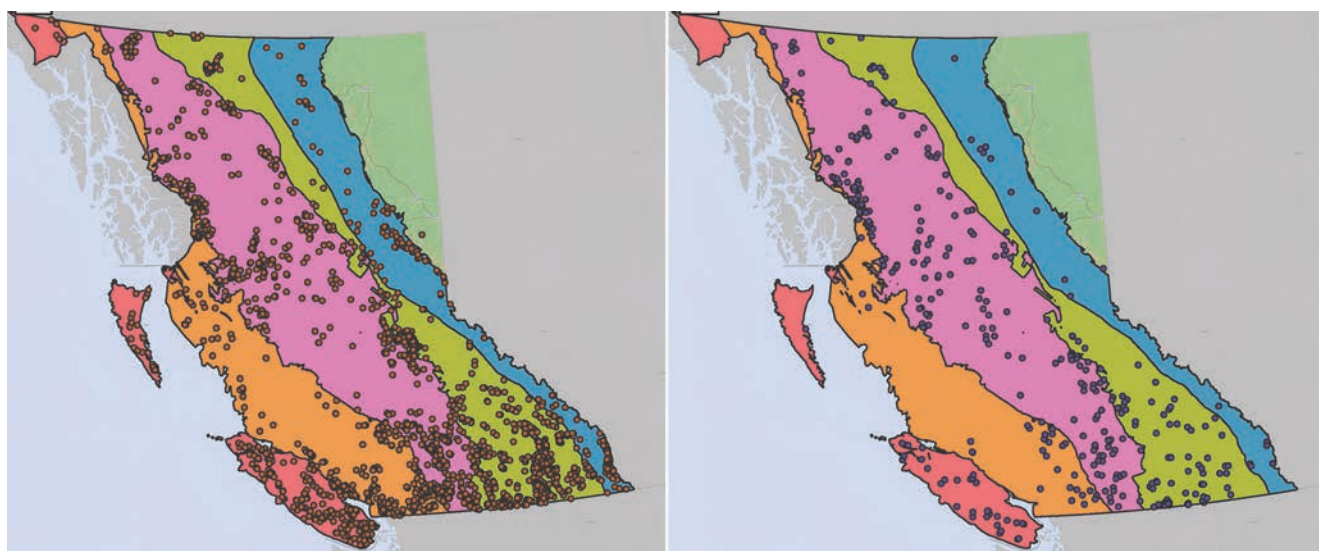
WHERE THE DATA HIDES

BC's public geoscience data offering was significantly enriched in late 2020 when a specialist company contributed a new layer of information to BC databases that no other Canadian province has, one that other provinces and territories are hoping to replicate: geolocated National Instrument (NI) 43-101 technical reports.

Canada's NI 43-101 Standards of Disclosure for Mineral Projects govern a company's public disclosure of scientific and technical information about its mineral projects. Any mining and mineral exploration company publicly traded on a Canadian stock exchange must follow these specific guidelines for disclosure designed to improve the accuracy and integrity of the information they provide. The disclosure must be based on information provided by a Qualified Person.

NI 43-101 requires a company to file technical reports at certain times, prepared in a prescribed format. These reports are stored in the System for Electronic Document Analysis and Retrieval (SEDAR) public filing system maintained by the Canadian Securities Administrators (CSA), most often as PDFs.

Although anyone can search the SEDAR website for technical mineral project information, the search interface is limited. The system also contains numerous document types beyond NI 43-101 reports, including annual reports, board filings,



The left image denotes MINFILE occurrences in BC, and the right image denotes the location of the National Instrument 43-101 project. PHOTO: PURPLE ROCK

real estate reports, etc. In addition, the reports within SEDAR are not georeferenced; the searcher must know the name of the company or companies who explored the area of interest previously to find relevant information. A physical location is necessary for prospectors and geoscientists to integrate data with other layers of information, such as bedrock geology maps, geophysical surveys, geochemical point data and social and environmental layers, such as traditional First Nation territories or sensitive wildlife areas.

AVAILABLE BUT NOT ACCESSIBLE

Geologist and historical data specialist Nicole D. Barlow, P.Geo., has been contemplating this challenge for several years and, in 2017, received funding from Geoscience BC to extract location information and valuable minerals data from a subset of NI 43-101 reports for projects in BC.

"National Instrument 43-101 reports are available but not accessible, or not as available to geologists as they

could be," said Nicole. "The SEDAR database's purpose is financial, so the CSA doesn't capture the geospatial or the geological information."

Nicole and the company she founded, Purple Rock Inc., were ideally suited for the project. Founded 14 years ago, Purple Rock has been working behind the scenes at the BCGS to make warehouses full of "eclectic" records into organized, publicly accessible digital databases since 2007. Among other tasks, they have been scanning, tagging, and uploading documents into Property File and updating MINFILE with the newly digitized information.

MINFILE is a database of known mineral occurrences in the province, and for each MINFILE occurrence, there can be a number of Property File documents that hold information related to that mineral occurrence or property that is not available elsewhere. Nicole said the collection dates back to 1850 and contains "everything from overlays on air photos to telegrams, telexes, faxes

and eight-foot-long maps, to unscanned hand-drawn maps and field notes with mosquitoes squashed on every page."

"When we started in February 2007, there were 630 documents [in Property File]," said Nicole. "Now there are over 84,000 and there's still more to do!"

UNLOCKING DATA TRAPPED IN PDFS

After coordinating between the CSA, the BCGS, and the Alberta Securities Commission—who host the SEDAR website—the Purple Rock team obtained 12,790 NI 43-101 reports from the CSA on a hard drive. The technical reports covered activity between August 2004 and September 2019 by Canadian companies across Canada and the world. Extracting all the NI 43-101 reports was the easiest way for the CSA to deliver the data to Purple Rock.

James Barlow, P.Eng., Nicole's business partner at Purple Rock, took on the role of determining which NI 43-101 documents reported on projects in BC. "First, we built a full text database for each page, which took a while for a computer to generate," said James. "We ended up with six gigabytes of data."

James used text searches and pattern recognition to determine which of the over 12,000 reports were from projects in BC. Due to inconsistent formatting, simply extracting the latitude and longitude for each project was not straightforward, but James was able to identify several hundred BC reports by searching for specific words, patterns, map sheet numbers and place names unique to BC.

"Using keyword searches and pattern searches, we narrowed it down from 12,000 to just under a thousand," said James.

Once the 996 reports for BC were identified, the Purple Rock team



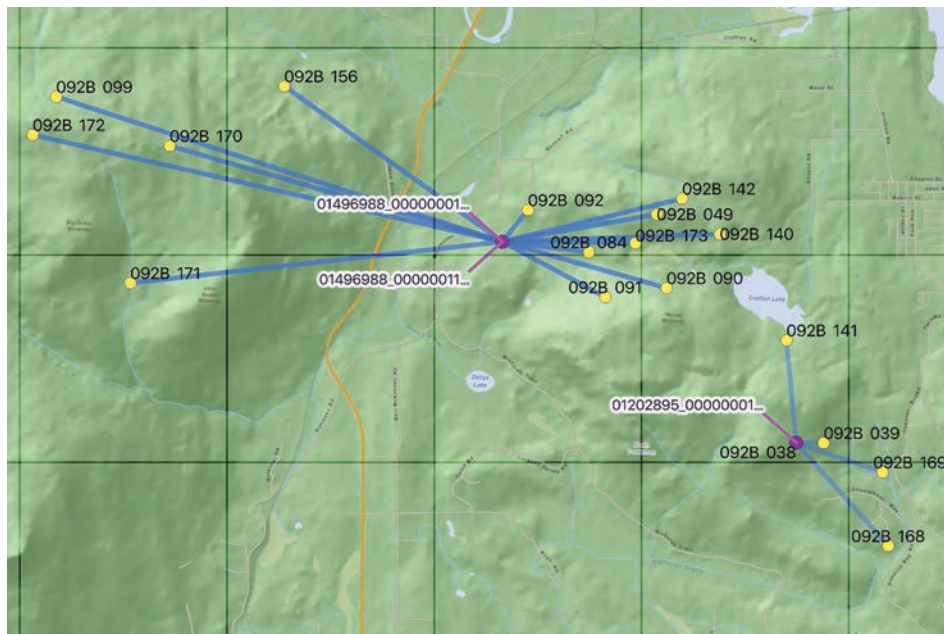
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Left: Hard copy reports stored at the BC Geological Survey. Purple Rock is digitally converting these reports into the database they created.

Right: The purple dot in the middle represents the National Instrument 43-101. The yellow dots represent the related MINFILE occurrences.

PHOTO: PURPLE ROCK

created a geographical information system (GIS) layer to map out the NI 43-101 report locations and began extracting important prospecting information from within the documents. This included rock, silt, soil, stream sediment, and vegetation geochemical sampling data; ground and airborne geophysical surveys; data from surface and underground development; and diamond, reverse-circulation and percussion drilling programs.

The next step was to use this information to update the work history and exploration results in MINFILE. Purple Rock updated 2,763 MINFILE occurrences across the province (18 percent of all MINFILE occurrences) with new details from NI 43-101 reports, including 82 new mineralization occurrences not previously recorded in MINFILE with several high-grade gold and copper occurrences.

Geoscience BC Vice President, Minerals, Christa Pellett, said: "This project has made all of this incredibly

valuable geoscience information and mineral deposit data for our province easier to find, locate, and use." In addition to MINFILE, the data mined from the NI 43-101 reports can be accessed via the BCGS's MapPlace application or downloaded from the Geoscience BC website to be used in other GIS platforms.

POSITIVE RESPONSE

Since the project results were published during the Association for Mineral Exploration (AME) BC's Roundup conference in January 2021, Nicole said the response has "been amazing; people are so excited."

Kendra Johnston, president and CEO of AME, said: "Providing that connection between 43-101's that are open, public data saved on the SEDAR site and bringing that into the BCGS database through the digitization process that Purple Rock has been working on is of extreme value to everyone."

Several other Canadian provinces and territories have already reached

out to Purple Rock to inquire if the process can be duplicated for their jurisdiction. However, it may take several years before we know if this project's results lead to new discoveries. ♦

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FEATURE

NATIONAL INSTRUMENT 43-101 TURNS 20: AN ADMIRER BUT IMPERFECT STANDARD





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The year 1997 was difficult year for the Canadian mining industry; shares of Calgary-based Bre-X, an insignificant penny stock just a few years earlier, soared to around CAD\$286.50 per share (split adjusted) on a mineral resource estimate that reported that its Indonesian-based property contained massive amounts of gold—up to 200 million ounces, according to one infamous Bre-X geologist.

There was only one problem: there was no gold. A reputable mining company on a due-diligence drilling program had the grim task of reporting that the Bre-X property in question actually contained no meaningful amounts of gold at all. Bre-X's share price plummeted almost overnight as investors realized that they'd been duped.

While Bre-X was a catalyst for change, Canadian securities regulators and others had already been busy trying to craft a good set of disclosure rules that carried the weight of law. They already knew that the regulatory environment needed firming up. Any mining company could say anything it wanted without any real restrictions or consequences, and there weren't enough tools available to investors—particularly everyday retail investors—to verify what companies disclosed about their properties. The result was National Instrument 43-101 that provided standards of disclosure for mineral projects.

STANDARDS AROUND DISCLOSURES

National Instrument (NI) 43-101 is a regularized set of rules and guidelines governing the disclosure of scientific and technical information related to mineral properties owned by any company that issues a security: stocks,

options, profits, earnings, royalties, or property interests. NI 43-101 standards apply to any issuer that disclosures own projects related to base, precious, or bulk metals, solid energy commodities, bulk minerals, dimension stone, precious stones, or mineral sands.

In essence, NI 43-101 means that issuers can make disclosures about their properties only if disclosures are quickly followed by an NI 43-101 Technical Report—a 19-part report (27 parts for advanced properties) that leaves no wiggle room for speculative or inaccurate conjecture. Under NI 43-101, a “disclosure” includes news

releases, presentations, social media posts, web posts, information circulars, etc. In short, issuers cannot publicly communicate material changes about their mineral property without backing it up with a technical report.

QUALIFIED PERSONS: THE KERNEL OF NI 43-101 TECHNICAL REPORTS

NI 43-101 Technical Reports are typically prepared (or at least vouched for) by a person or people who the Instrument calls “Qualified Persons”—professional engineers or geoscientists that belong to a recognized professional association, who have at least five years of relevant experience and competence, and are in



PHOTO: ANOTHER77 / SHUTTERSTOCK.COM

THE *PROFESSIONAL GOVERNANCE ACT* IS NOW IN FORCE.

WHAT'S NEXT?

On February 5, 2021, the *Professional Governance Act* (PGA) came into force, and replaced the *Engineers and Geoscientists Act*. This change means that registrants will have new obligations they need to be aware of, and new requirements they need to follow.

Key changes include:

- An updated Code of Ethics
- New mandatory COntinuing Education requirements, beginning July 1, 2021
- New requirements to keep your business and contact information up-to-date
- New requirements for firm regulation, beginning July 2, 2021

To learn more about what's changing under the PGA, access resources, and sign up for or download webinars on key requirements, visit egbc.ca/pga.

For questions, email professionalgovernance@egbc.ca.



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many cases independent of the issuing company. Through the NI 43-101, a company can only report what the Qualified Person (QP) says is true, and they must do so only in a prescribed manner. A QP or multiple QPs must jointly take responsibility for the entire NI 43-101 Technical Report, and review and approve the issuer's other disclosures.

Under NI 43-101, the duties of the QP don't end there. Among other things, at least one of the QPs must visit the property; they must explain the geological setting and mineralization, outline the drilling program, verify the preparation, analysis, and security of samples, comment on sample quality and data integrity, correctly classify resources (as prescribed by category definitions supplied by Canadian Institute of Mining, Metallurgy and Petroleum), and describe the property's history—all using plain language and with only a very limited reliance on other experts and reports.

SOME ASPECTS PROVE ARDUOUS AND COMPLICATED

Not surprisingly, securities commissions across Canada have noted that many NI 43-101 Technical Report are coming up short with respect to standards. Some

submitted reports are too lengthy, or they are filled with complicated technical jargon that everyday investors might find difficult to navigate. Other reports are filed without correct QP consent forms, or they may contain inappropriate disclaimers, or they may lack important assumptions, parameters, and methods, or they recommend future work without a proper scope and budget. Still others mix inferred resources with other mineral resource categories, or are authored by someone that doesn't meet the definition of a Qualified Person in the Instrument.

Securities commissions across Canada are tasked as NI 43-101 gatekeepers for more than 1,600 issuers in Canada, more than 1,500 of which are listed on Canadian stock exchanges. If they review a report and find it to be non-compliant, there are corrective tools at their disposal: they can reject a report (and require a company to re-file a new report); they can halt trading for a specific company; or, they can file a complaint with a QP's professional association (like Engineers and Geoscientists BC) if they believe that the QP's errors or omissions were serious.

These discrepancies highlight two difficulties: the authorship of NI 43-101



Technical Reports may be overly burdensome for some QPs to accomplish, or some QPs may not have access to the necessary tools or education.

EDUCATION AND TRAINING ARE KEY

Jeremy Vincent, P.Geo. and Council member of Engineers and Geoscientists BC who has co-authored NI-43-101 Technical Reports as a QP, said that, as the Instrument ages, it's important to remember the purpose for which it was first developed.

"The spirit of NI 43-101 is to provide a readable, objective, scientific view of a mineral deposit for regular investors," he said. The requirements of the Instrument itself are formidable; but Vincent believes that, when it comes to guiding QPs, the principle of "right-touch" regulation—that is, the concept of applying only the amount of regulatory force that is needed to protect the public—is important. That's why Vincent prefers education to support QPs in developing NI 43-101s.



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“Let’s open a conversation,” he said. “The idea is to ensure professionals are equipped to complete NI 43-101 reports in a way that protects investors and the public. The best question is: what do QPs need to make that always happen?”

Dr. Greg Gosson, P.Geo., Technical Director of Geology and Compliance at Wood and a leading NI 43-101 expert, agrees that education is almost always preferred over enforcement—but added that there’s a difference between just trying to understand and comply with the disclosure rules in NI 43-101, and the equally important understanding of the principles behind the rules and the industry accepted professional practices that form the basis of the information being disclosed.

Gosson also favours exposing QPs to “good courses” on mineral project disclosure rules, and industry accepted standards and practices, to bridge the gap between disclosure standards and the practice standards that provide the information being disclosed.

Despite these challenges, NI 43-101 is still considered in many circles to be the tightest standard available. It’s telling that the US-based Security and Exchange Commission (SEC) largely modeled its new rules for mineral property disclosure (S-K 1300), in development since 2018, after NI 43-101; the new SEC rules came into effect on February 25, 2019 and became mandatory January 1, 2021. Other reporting codes and disclosure rules in other jurisdictions bear a striking

resemblance to many parts of NI 43-101. And while there may be challenges to full compliance with the instrument, that other securities authorities in other jurisdictions consider NI 43-101 to be a good reference point is a strong endorsement, and an indication that NI 43-101, while not perfect, is often accomplishing what it was designed to accomplish. ♦



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Disciplinary hearings, notices, and decisions can be found on our website, at egbc.ca/Discipline-Notices.

Engineers and Geoscientists BC's website also 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: HEQING (ALBERT) JIAN, P.ENG., COQUITLAM, BC

Engineers and Geoscientists BC issued a Notice of Inquiry to Heqing (Albert) Jian, P.Eng., on November 25, 2020, which alleged that he demonstrated unprofessional conduct, incompetence, or negligence in relation to engineering services he provided for a sewerage system in Maple Ridge. Specifically, the Notice of Inquiry alleged that Mr. Jian acted as the authorized person as defined in the Sewerage Systems Regulation, when the design and construction of sewerage systems is outside his area of expertise. The Notice of Inquiry alleged that Mr. Jian also failed to directly supervise the individual who was conducting the majority of the system's design, installation, and inspection work. The Notice of Inquiry alleged that Mr. Jian failed to design the sewerage system in a manner consistent with the Sewerage System Standard Practice Manual (SPM) or an alternative standard practice, by:

- designing a system with a maximum infiltrative surface per orifice in excess of that provided by SPM;
- failing to identify the lineal loading rate used and how it was calculated;
- failing to identify the hydraulic loading rate used for the basal area and how it was calculated;
- failing to identify the hydraulic loading rate for the mound sand and how it was calculated;
- inconsistently reporting soil texture;
- designing a system with a pump tank volume below that required by the SPM;
- failing to measure, or identify measurements for, the squirt height for the system's distribution field lateral orifices;
- failing to measure, or record, the pump run time, dose volume or drainback volume;
- inconsistently recording the septic tank volume making it unclear whether the septic tank volume is adequate for the property in question; and

- incorrectly recording the location of the septic tank, pump chamber and sand mount on the property.

The Notice of Inquiry also alleged that Mr. Jian signed and sealed a Record of Sewerage System form and a Letter of Certification, which affirmed the system's plans were consistent with the SPM, and that the sewerage system had been constructed in accordance with standard practice, when he knew, or ought to have known, that the system was in fact not consistent with the affirmations in these documents.

The Notice of Inquiry alleged that Mr. Jian's conduct contravened section 20(9) of the *Engineers and Geoscientists Act*, Principles 2 and 3 of the Code of Ethics, and section 14(b) of the Bylaws.

Instead of proceeding to a disciplinary inquiry, Mr. Jian agreed to a Consent Order, dated January 14, 2021, in which he admitted the allegations in the Notice of Inquiry.

Mr. Jian agreed to a two-month suspension of his registration, beginning January 18, 2021. Mr. Jian agreed that, before he undertakes any sewerage system design work after his suspension, he will complete an education course related to the design of sewerage systems. Mr. Jian agreed that his sewerage system designs will be peer-reviewed for 12 months following the suspension period, or until he completes 10 sewerage system projects, whichever comes later. Mr. Jian further agreed that he will commence a practice review within six months following the peer review period. Mr. Jian also agreed to complete the Professional Engineering and Geoscience Practice in BC online seminar, the Professional Practice Examination, and pay \$5,000 towards Engineers and Geoscientists BC's legal and investigative costs.

If Mr. Jian fails to comply with the requirements of the Consent Order, his membership will be suspended until he has done so.

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IN MEMORIAM

Engineers and Geoscientists BC announces with regret the passing of the following registrants:

David Steven Babensee, P.Eng.

George Ellis Barclay, P.Eng.
(Non-Practising)

Dipak Basu, P.Eng.
(Non-Practising)

Hanford Powell Burden, P.Eng.

Robert James Davies, P.Eng.
(Non-Practising)

Clifford Allan Day, P.Eng.
(Non-Practising)

Brian Peter John Dean, P.Eng.

Michael Lee Frost, P.Eng.

George Joseph Anthony Gatt, P.Eng.
(Non-Practising)

John Bruno Giovanetto, P.Eng.
(Non-Practising)

Bruce Whitmee Irvine, P.Eng.

Ray Emerson Lewis, P.Eng.
(Non-Practising)

Donald Montgomery MacLeod, P.Eng.
(Non-Practising)

Patrick Joseph McCarter, P.Eng.
(Non-Practising)

Charles Anderson McKenzie, P.Eng.

Donald James Noakes, P.Eng.

Avtar Singh Pall, P.Eng.
(Retired)

James Vincent Parker, EIT

Farhad Pourdavoudkharatmahale, P.Eng.

Rodney Thomas Saxon, P.Eng.

Albert Daniel Siega, P.Eng.

William John Spaulding, P.Eng.

John Ho Wai Tam, P.Eng.

Hans Waelti, P.Eng.

Michael Glen Thio Watts, P.Eng.

Bryce Kelm Wilson, EIT ♦

ORGANIZATIONAL QUALITY MANAGEMENT PROGRAM

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

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Arya Engineering Inc.
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B.R. Thorson Consulting Ltd.
Brymark Installations Group Inc.
Carlson Construction Group Inc.
Cascara Consulting Engineers Limited
Centroproject Consulting Inc.
Check Engineering
Civic Consultants Abbotsford Ltd.
Corwest Fabrications Ltd.
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Dobson Engineering Ltd.
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Evoke Buildings Engineering
Exceed Electrical Engineering Ltd.
First Light Energy Solutions Ltd.
GCI Geotech Consulting Inc.
Gwaii Engineering Ltd.
IQ Engineering Ltd.
Izett Engineering Ltd.
KJW Engineering Ltd.
Kontzamanis Graumann Smith
MacMillan Inc.
M2 Engineering
Midgard Consulting Inc.
New Town Architecture
& Engineering Inc.
Nexterra Systems Corp.
Profor Resource Development Inc.
Van den Brink Engineering Ltd.
Vancouver Pile Driving Ltd.
Watershed Engineering Ltd.
Westmar Advisors Inc.
Wildwood Engineering
& Environmental Ltd.
Willerton Engineering Ltd.

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"Just going into Google Earth to look at that slope above Elliot Lake, I can see all sorts of evidence that that spot and the surrounding slopes were slowly sagging," Clague says. "Having these earlier images and datasets is critical for tracking how the landscape is changing over time."

November 28 provided a classic example of how a landslide can trigger a chain of other natural hazards that play out over many kilometres. As geoscientists come to understand the factors that predisposed the slope above Elliot Lake to collapse and set in motion the ensuing hazard cascade, that information will better inform them about how similar events elsewhere could put British Columbians at risk. ♦



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DISCIPLINARY NOTICE: DOUGLAS VANHOOREN, P.ENG., CRANBROOK, BC

Engineers and Geoscientists BC issued a Notice of Inquiry to Douglas Vanhooren, P.Eng., in November 2020, regarding the engineering services he provided for a welding shop ventilation upgrade project in the District of Sparwood. The Notice of Inquiry alleged that Mr. Vanhooren prepared sealed drawings which were deficient and not consistent with industry standard practices. The deficiencies alleged in the Notice of Inquiry were as follows.

- The design's welding fume exhaust in the welding shop's south welding bay failed to extract sufficient air volume due to the exhaust fan being undersized in relation to the static pressure it generates and the presence of exhaust on the same duct as the welding extraction arm.
- The design's welding fume exhaust system in the south shop failed to meet the minimum duct transport velocity of 2,000 to 2,500 feet per minute required by industry standard practice.
- The design's welding fume extraction system in the welding shops north bay failed to extract sufficient air volume because its exhaust fans were undersized in relation to the static pressure they generate, and because of the presence of exhaust grilles on the same duct as the welding exhaust arms.
- The design's makeup air intake system in the north shop failed to deliver sufficient air volume because the supply main duct for the second makeup air unit and drum type louvers installed on the air supply main duct were both undersized.

- The design was missing necessary details, including balancing dampers on either the supply or exhaust ducts; the equipment schedules also did not include external static pressure for fans.

Instead of proceeding to a disciplinary inquiry, Mr. Vanhooren agreed to a Consent Order, dated February 2, 2021. In the Consent Order, Mr. Vanhooren admitted to the allegations in the Notice of Inquiry, and that he demonstrated unprofessional conduct or negligence in connection with his design of the welding shop ventilation upgrade, and that he contravened Principles 2 and 3 of the Engineers and Geoscientists BC Code of Ethics (under the *Engineers and Geoscientists Act*). The Consent Order noted that Mr. Vanhooren was cooperative, acknowledged wrongdoing, and was forthcoming with his admissions during the investigation.

Mr. Vanhooren agreed to pay a fine of \$1,000, complete and pass the Professional Practice Examination and the Professional Engineering and Geoscientists in BC Online Seminar, complete ASHRAE Learning Institute's *HVAC Design: Level I – Essentials* and *HVAC Design: Level II – Applications* courses, and pay \$4,000 toward Engineers and Geoscientists BC legal costs. Mr. Vanhooren also agreed that any work related to HVAC engineering will be subject to peer review for at least one year, and that following the peer review, he will undergo a Practice Review with a focus on HVAC design.

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UPCOMING WEBINARS

TEAM BUILDING ON ENGINEERING AND CONSTRUCTION PROJECTS

April 13, 2021

The session will focus on team building and partnering. This session attempts to create an environment where trust and teamwork prevent disputes, foster a cooperative bond to everyone's benefit, and facilitate the completion of a successful project.

WRITING EFFECTIVE EMAILS

April 14, 2021

In today's environment, emails are by far the most commonly used communication method in the workplace. With an increase in reliance on connecting remotely, clients and colleagues expect your emails to be clear and concise. This webinar is focussed on giving you the tools to write effective emails.

PROFESSIONAL PRACTICE GUIDELINES: GEOTECHNICAL ENGINEERING SERVICES FOR BUILDING PROJECTS

April 14, 2021

This seminar will review and discuss Engineers and Geoscientists BC's *Professional Practice Guidelines - Geotechnical Engineering Services for Building Projects*; a revision to the existing guideline was published on September 17, 2020.

PROJECT CLAIMS AND DISPUTES ON ENGINEERING AND CONSTRUCTION PROJECTS

April 15, 2021

In the engineering and construction industry, contract claims and disputes are common issues. They occur between owners and contractors, contractors and their subcontractors, contractors and vendors. Resolution of the claims and disputes can be an adversarial and costly process for all parties. This session discusses the causes and types of claims, the procedures by owners and contractors to avoid claims, and methods to quantify and resolve claims.

MINERAL RESOURCE RISK ASSESSMENT: ADVANCING FROM ESTIMATION TO SIMULATION

April 19 and 21, 2021

This course will provide the framework for mining professionals to understand the methodology to construct a mineral resource estimate and extend this workflow to conditional simulation for uncertainty assessment. The first day will present the fundamentals for mineral resource estimation, highlighting the main decision-making tasks and their impact on the resulting mineral resource model. The second day will focus on conditional simulation, the practical details associated to its implementation, and its many possible applications to mineral resource risk assessment in the mining sector.

INTRODUCTION TO HYDROGEOLOGY AND GROUNDWATER MANAGEMENT

April 20, 2021

This seminar is tailored towards attendees who wish to have a better understanding of hydrogeological and groundwater management concepts.

WOMEN IN LEADERSHIP SERIES

April 26-May 17, 2021

This series will enable women to view leadership through the lens of communication—supporting them to develop the skills needed to be seen as strong confident leaders. Through four webinars and one-year access to a self-learning course, registrants will learn how to communicate with clarity and intention, unlock the power of their voice, and develop a strong leadership brand.

EMBRACE YOUR LEADERSHIP IDENTITY

April 26, 2021

The Women in Leadership Series enables women to view leadership through the lens of communication—supporting them to develop the skills needed to be seen as strong, confident leaders. In this session, participants will explore the concept of leadership identity and its importance to communicating with confidence.

MODELING GROUNDWATER FLOW AND CONTAMINANT TRANSPORT AT MINE SITES

April 27, 2021

This is a fast-paced seminar intended for researchers, regulators and consultants who are familiar with the basics of groundwater modeling and want to learn more about leading practices and, more importantly, how modeling results should be interpreted.

EROSION AND SEDIMENT CONTROL: MASTER CLASS

April 28 and 29, 2021

This session will challenge participants to leverage their understanding of Erosion and Sediment Control essentials, apply industry innovations to achieve compliance, and deploy best practices in a fiscally responsible and approvable manner for successful implementation.

SHAREPOINT, ONEDRIVE, AND TEAMS TRAINING

April 29, 2021

The focus of this course is on how to get the most out of your SharePoint site—explore the tools and the customizations; and learn how to find and conveniently access documents, and how many of these tools can connect with Outlook. We will also explore Teams—learn how it can transform and simplify your collaborative efforts by reducing email and keeping all team or project information in one place, and explore the various features that can be added to Teams, and specifically we will spend time using Planner and OneNote.

LEADING MAJOR CAPITAL PROJECTS

May 4, 2021

The level of uncertainty and volatility associated with major capital projects make a predictable outcome almost impossible to achieve, as these large projects are more complex and last longer. These projects present great challenge to busy leaders, managers, and executives. This session provides an opportunity to discuss the relationship between the business and project sides of the organization.

We encourage you to take advantage of the Online Learning Centre, at egbc.ca/online-learning, which provides remote educational opportunities. The Centre now hosts more than 50 online learning opportunities on a variety of topics.

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