ENGINEERS AND GEOSCIENTISTS BRITISH COLUMBIA

SEPTEMBER/OCTOBER 2021

INNOVATION

MANAGEMENT

CENTRAL INTERIOR COPPER-GOLD RESEARCH Apollo 14 Polaroid TV Dinners SpaceX Instagram Uber Eats



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UNDER COVER DETECTIVES

Within a massive area in BC known for its copper-gold deposits lies a 300-kilometre section that is mysterious low in mining and mineral exploration activity. Geoscience BC knew the area was mostly barren of mineral exploration because of its lack of telltale geological features, and a thick layer of overburden—but nonetheless wanted to know what lies beneath. It dispatched two researchers to reanalyze samples and gather new data in the area.



COVER STORY

THE MANAGEMENT OF NATURAL ASSETS FOR LOCAL GOVERNMENTS

A recent professional practice guideline provided guidance to BC engineers and geoscientists about the management of assets for local governments. But a BC non-profit organization also produced a companion guide, devoted exclusively to the management of natural assets, that earned endorsement from Engineers and Geoscientists BC's Council.



2021 PRESIDENT'S AWARDS

Engineers and Geoscientists BC names the recipients of the 2021 President's Awards and the Sustainability Award, Environmental Award, Mentor of the Year Award, and Forest Engineering Award of Excellence.

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ON THE COVER

Comox Lake is part of the Comox Lake watershed, a 461 square-kilometre network of mountains, forests, rivers, creeks, and streams. The watershed supplies drinking water for many Comox Valley residents, but portions are used for power generation and recreation. PHOTO: COMOX VALLEY REGIONAL DISTRICT



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.





A ONCE-IN-A-GENERATION OPPORTUNITY

It is with mixed emotion that I share my final ViewPoint column. This past year has been extremely busy and challenging for Engineers and Geoscientists BC, and I am honored to have been a part of it.

As you know, the *Professional Governance Act* (PGA), brought into force in February 2021, has brought with it unprecedented changes to our regulatory and governance

framework. For instance, the new requirement to regulate firms that practice engineering or geoscience in BC has now led to nearly 2,000 permits to practice. And, continuing education hours are now mandatory for registrants, which will ensure that professionals receive the latest practice, ethical, and regulatory training.

These are just two of the changes under the PGA that will enhance trust in the professions and in the firms that deliver engineering and geoscience services. But implementation of these changes would not be possible, and would not achieve the intended positive impacts, were it not for the work of Engineers and Geoscientists BC's staff and volunteers.

These efforts are in addition to progressing important programs and initiatives, like equity, diversity, and inclusion, the 30 by 30 initiative, Indigenous Truth and Reconciliation, and our first Climate Change Action Plan. Staff and volunteers advanced these initiatives in addition to regular duties and requirements associated with being a regulatory body.

I recently had a conversation with one of our directors and we shared our appreciation for the dedication and hard work of staff. As he so eloquently described it: "Staff are energized by being involved in a once-in-a-generation opportunity to make a positive change in public safety."

This view has been echoed in my recent conversations with our CEO, Heidi Yang, P.Eng., FEC, FGC (Hon.), and our past president, Lianna Mah, P.Eng., FEC, FGC (Hon.) I am continually amazed at the hard work, dedication, and competence of Engineers and Geoscientists BC staff. Their collective investment in strong regulation, efforts to help inform and support registrants in their practice, and time spent researching and implementing solutions to address registrants' ideas and concerns is inspiring.

As my term as president comes to and end, I want to take this opportunity to let staff and volunteers know that your efforts are noticed and appreciated. On behalf of Council: thank you! You make our work so much easier, and all of BC benefits from your efforts.

LARRY SPENCE, P.ENG., President president@egbc.ca

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ENGINEERS AND GEOSCIENTISTS BRITISH COLUMBIA

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ASSOCIATION

MOUNT POLLEY: DISCIPLINARY FINDINGS ANNOUNCED FOR TWO INDIVIDUALS

Engineers and Geoscientists British Columbia has announced disciplinary findings against two individuals connected with the 2014 breach of the tailings storage facility at the Mount Polley Mine.

Former engineer Stephen Rice and engineer Laura Fidel, P.Eng., were found to have demonstrated unprofessional conduct in the course of their work at the Mount Polley Mine.

A Discipline Hearing Panel found that Mr. Rice failed to properly fulfill the role of review engineer, demonstrated unprofessional conduct by allowing a junior engineer who had little experience with embankment design (Laura Fidel, P.Eng.) to act as Engineer of Record for the project, failed to ensure sufficient observation and monitoring of the tailings dam, failed to document his review work, and failed to ensure an excavation left unfilled at the toe of the embankment was assessed to determine what impact it may have on the stability of the embankment.

In addition to other penalties, the Discipline Hearing Panel imposed a \$25,000 fine, the maximum available at the time. Mr. Rice also agreed to pay \$107,500 in legal costs to Engineers and Geoscientists BC. Mr. Rice resigned his engineering licence in January 2018 and is no longer permitted to practise professional engineering in British Columbia.

A separate Discipline Hearing Panel found that Laura Fidel, P.Eng., committed several acts of unprofessional conduct. The Panel found that Ms. Fidel failed to ensure sufficient observation and monitoring of the tailings dam while acting as Engineer of Record, including by failing to ensure sufficient site visits and failing to monitor seepage flows which could provide evidence of a potentially unsafe condition within the embankments. Ms. Fidel also failed to ensure that an excavation left unfilled at the toe of the embankment was assessed to determine what impact it may have on the stability of the embankment, and demonstrated unprofessional conduct by sealing design drawings for the Stage 9 embankment raise without undertaking sufficient review of the design which was not prepared by her. A number of other allegations against Ms. Fidel were dismissed by the panel. A penalty hearing has not yet been scheduled in Ms. Fidel's case.

Engineers and Geoscientists BC is responsible for establishing and upholding standards of professional practice and ethical conduct for the professions. If it is determined that an engineer or geoscientist may have breached these standards, Engineers and Geoscientists BC takes action through a comprehensive investigation and discipline process.

Following the breach, Engineers and Geoscientists BC took steps to improve dam safety in BC, which included producing professional practice guidelines for site characterization for dam foundations in BC, updating



PHOTO: TERRASAURUS AERIAL PHOTOGRAPHY LTD.

existing guidelines to confirm the duties of the "Engineer of Record," and holding professional development seminars. Engineers and Geoscientists BC is currently updating its guidelines on legislated dam safety reviews and has recently been granted the authority to regulate engineering and geoscience firms—a new regulatory responsibility that will enhance its ability to protect the public and address standards of conduct and practice at the organizational level.

A disciplinary hearing is scheduled to proceed later this year for a third individual. The allegations in that case have not been proven.

A summary of the findings is provided beginning on Page 33. The full text of the disciplinary decisions can be found at *egbc.ca/Discipline-Notices*.



ASSOCIATION

DUTY TO REPORT REQUIREMENTS UNDER THE *PROFESSIONAL GOVERNANCE ACT*

Fulfilling the duty to report obligation is an important role that registrants play to protect the public. Under Engineers and Geoscientists BC's revised Code of Ethics, (at *egbc.ca/Code-of-Ethics*) the duty to report is an ethical obligation for a registrant to report to the appropriate authority about regulated practice that may pose a risk of significant harm to the environment or health or safety of the public and conduct which may be illegal or unethical.

This new duty in the updated Engineers and Geoscientists BC Code of Ethics stems from the *Professional Governance Act* (PGA), which outlines a new statutory duty to report. Under the PGA, all registrants, including registrant firms, have a duty to report situations where the regulated practice of another registrant (including a firm) may pose a risk of significant harm to the environment or to the health or safety of the public.

HOW REGISTRANTS CAN REPORT

If you are considering reporting, we recommend reviewing section 4.9.6 of the Guide to the Code of Ethics, which

outlines considerations for registrants in reporting a significant risk of harm, illegal activity, or unethical behaviour. If you have questions following review of the Guide to the Code of Ethics, contact *practiceadvisor@egbc.ca*. Once you determine you need to report, contact *complaints@egbc.ca*.

Failure to report could be an offence under section 106 of the PGA, or a possible investigation and discipline action by Engineers and Geoscientists BC.

PROTECTIONS FOR REPORTING REGISTRANTS

A reprisal is an act of retaliation against a registrant who makes a report under the PGA. To ensure registrants are protected, section 103 of the PGA prohibits anyone from evicting, discharging, suspending, expelling, intimidating, coercing, imposing any pecuniary or other penalty on or otherwise discriminating against a registrant who makes a report. And, section 106 of the PGA makes reprisals against reporting registrants an offence, and any person convicted is subject to penalties.

RESOURCES FOR REGISTRANTS

Several resources are available to assist registrants in navigating the duty to report requirements.

- See the Duty to Report page of our website (at *egbc.ca/Duty-To-Report*) for an overview of the key requirements.
- The Professional Governance Act outlines specific requirements and obligations in section 58; sections 103 and 106 provide information on reprisals.
- The Office of the Superintendent of Professional Governance offers duty to report guidance.
- Firms seeking assistance can review section 4.14 of the Regulation of Firms Permit to Practice Manual (at egbc.ca/Firms).
- The Guide to Code of Ethics, and the updated Code of Ethics itself, are available at egbc.ca/Code-of-Ethics, along with a recorded webinar entitled "Understanding the New Code of Ethics".

If you have questions when considering reporting, contact a Practice Advisor at *practiceadvisor@egbc.ca*.

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WHAT'S NEXT FOR FIRMS WITH A PERMIT TO PRACTICE?

Beginning October 1, 2021, all firms that engage in the practice of professional engineering or geoscience should have applied for and received a Permit to Practice.

WHAT IS REQUIRED NOW?

Every firm issued a permit will receive a seven-digit permit number that provides proof of registration with Engineers and Geoscientists BC and must be applied to all authenticated documents issued on behalf of the firm. The application of the permit number on authenticated documents is under the authority of the Responsible Registrant for the firm. There is no seal/ stamp associated with the permit; only a seven-digit number that must appear on authenticated documents.

Within 12 months of being issued a Permit to Practice, a firm must complete:

• The Permit to Practice Training.

The Responsible Registrant of the firm must complete training (approximately 8 hours) that provides guidance on the requirements of a Permit to Practice. All individuals acting as Responsible Registrants for a registered firm are required to complete this training. This course is also available to any individual seeking a better understanding of the ethics, quality management, and continuing education requirements for firm regulation.

• The Professional Practice

Management Plan. A firm's Professional Practice Management Plan (PPMP) documents the policies and procedures in place that indicate how the firm will meet quality management, ethics, and continuing education requirements. The PPMP must also contain the firm's organizational structure, names of the registrant firm's Responsible Officer and Responsible Registrant(s), the registrant firm's area(s) of practice, and the Responsible Registrant(s) designated to each area of practice at the registrant firm.

To ensure these requirements are in place, the firm will be eligible for its first audit 12 months after being issued a permit. In addition, the firm must update its contact information and its PPMP each year and comply with mandatory audits every three-to-five years.

RESOURCES

Engineers and Geoscientists BC offers tools and materials that provide guidance to firms on completing the requirements of a Permit to Practice at *egbc.ca/Firms*. These resources include online training (comprising six courses through 15 selfpaced modules), Professional Practice Management Plan templates, and the Regulation of Firms Manual.

For questions about the requirements of a Permit to Practice, email *firms@egbc.ca*.



2022 CERTIFIED PROFESSIONAL AND ADVANCED CODE KNOWLEDGE COURSES NOW OPEN FOR REGISTRATION

Engineers and Geoscientists BC and the Architectural Institute of British Columbia (AIBC) are offering the popular Certified Professional (CP) Course and the Advanced Code Knowledge (ACK) Course in 2022, both of which are now open for registration. The courses will be based on the 2018 BC Building Code and the 2019 Vancouver Building By-law. Both courses will be conducted online. CP Exams will be conducted in person in a manner that follows government guidance on COVID-19. Registration for both courses closes December 17, 2021, or when course capacity is reached.

CERTIFIED PROFESSIONAL COURSE

Engineers and Geoscientists BC and AIBC have been jointly offering the CP Program since 2015. The CP Program is an alternative to the conventional building permit and inspection process adopted by Vancouver, Surrey, Abbotsford, West Vancouver and other Authorities Having Jurisdiction (AHJ). Through the program, participating AHJs can issue a building permit on the assurances of a CP, who also must be a registered professional (i.e., professional engineer or architect).

The CP Course schedule consists of 12 full-day sessions on Wednesdays from January 19, 2022 to April 20, 2022. There are no classes on March 9, 2022 (CP Course break), and March 16, 2022

PHOTO: JOANNE VINCENT/STOCK.ADOBE.COM

(Spring Break). There is 1 half-day tutorial on April 27, 2022. The CP Course concludes with 2 full-day exams. This year, the CP Course cost is \$5,500.

Although anyone may take the CP course, only architects and professional engineers may practice as CPs. Intern Architects AIBC and engineers-intraining who meet all CP course requirements and pass the CP exams will be able to practice as CPs when they become registered as architects or professional engineers.

ADVANCED CODE KNOWLEDGE COURSE

The ACK Course is designed to provide advanced building code knowledge without CP certification. It provides all the content of the CP course, but excludes exams, projects, and site tours. The ACK course comprises 7 full-day sessions on Wednesdays from January 19, 2022 to March 2, 2022. The cost for this course is \$3,500.

Potential participants are encouraged to explore the possibility of partial grant funding for the courses, through the WorkBC, BC Employer Training Grant. To learn more, visit the Government of BC's Workforce Training Stream webpage.

For more information or to register, visit the AIBC Events website (at *aibc.memberpro.net/ssl/main/body. cfm?menu=events*), and select the year "2022" from the drop-down menu. You may also contact CP Program Manager, Teresa Coady, FRAIC Architect AIBC AIA LEED Fellow, at *tcoady@egbc.ca* or 604.639.8185.

For more information, or for registration and training grant links, visit *egbc.ca/ Certified-Professional*.



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ENGINEERS AND GEOSCIENTISTS BC HELPS STUDENTS HANDLE COST PRESSURES

Each year, the Engineers and Geoscientists BC's Foundation provides scholarships, bursaries and awards to engineering and geoscience students, based on financial need, academic standing, community involvement, extracurricular activities, and a student statement. The Foundation offers over 30 scholarships and bursaries to students from a range of accredited post-secondary institutions.

This year, The Foundation received \$83,000 in donations from more than 1,600 donors. In addition, over 500 Engineers and Geoscientists BC volunteers asked that the association make a \$20 donation on their behalf instead of a volunteer gift. The Foundation would like to thank all donors who have generously made this program possible. Annual contributions to the

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Foundation remain integral to its success to enable the maintenance and expansion of its scholarship program.

This year, Stephanie Quon was selected to receive the Engineers and Geoscientists BC - BC Hydro Scholarship. With the support of BC Hydro, ten students receive \$1,500 toward their engineering or geoscience education.

Stephanie is studying electrical engineering at UBC and expects to graduate in May 2023. She selected the biomedical option of the electrical engineering program and hopes to pursue a career in either of those fields. "What drew me to a career in engineering was a natural curiosity about the world around me and an interest in innovation," she said. "As an 'engineered' world surrounds us, I am fascinated by how each component works and the inner workings of the objects we use in our dayto-day lives." Stephanie hopes to pursue a career in medical device research and development, firmware engineering, or software engineering.

To continue her learning outside of the classroom, Stephanie is part of the Biomedical Engineering Student Team (BEST), and she's worked as an undergraduate research assistant in several labs. Throughout her time at UBC, Stephanie has been involved with several student groups, including UBC Women in Engineering, the Engineering Undergraduate Society, and the Electrical and Computer Engineering Student Society.

A year's tuition for Stephanie costs around \$9,000, and books and other expenses cost her about \$12,000. Over the past year, Stephanie worked as a research assistant and undergraduate teaching assistant to support herself financially, which was very challenging. The rising cost of tuition and expenses alongside a full course load and pandemic has made it difficult for Stephanie. However, with the support of the Foundation, Stephanie is able to focus a little more on her academic and career goals and towards becoming a professional engineer.

The Engineers and Geoscientists BC Foundation, a registered charity, is governed by a volunteer board of directors, all of whom are professional engineers and geoscientists registered with Engineers and Geoscientists BC.

In 2021, the Foundation broadened assistance by announcing two new awards: one to support women returning to work and a second to support Indigenous students in geoscience. The Tricia J. Cook Memorial Fund will be awarded annually to support an outstanding woman in engineering or geoscience in BC who is returning to her profession after parental leave. The new Brian Nadjiwon Memorial Scholarship (established by Nadijwon's family through Kwantlen Polytechnic University) has been established to support an Indigenous student pursuing a geoscience at a BC post-secondary institution. It lowers barriers to access for Indigenous people seeking an education in geoscience both by providing financial support and incentivizing them to consider a geoscience education.

The rising costs of education has made it challenging for students. Over the next year, the Foundation plans to increase award amounts to better alleviate the financial pressures for engineering and geoscience students to a minimum of \$2,500 per scholarship. Please help us by making a donation to the Engineers and Geoscientists BC Foundation—every dollar donated will go directly towards a scholarship or bursary. Tax receipts are issued for donations greater than \$20. To make a donation, visit *egbc.ca/ Foundation*, email *students@egbc.ca*, or call 604.430.8035.

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NEW GUIDELINES PLANNED FOR EROSION AND SEDIMENT CONTROL IN COLLABORATION WITH THE COLLEGE OF APPLIED BIOLOGY

Engineers and Geoscientists BC and the College of Applied Biology plan to collaborate to develop joint professional practice guidelines on Erosion and Sediment Control in BC.

Erosion and Sediment Control (ESC) is the management of runoff, erosion, and sediment from a site under construction. Sediment runoff from development can travel to natural environments, where suspended particles in water can negatively affect fish, fish habitat, and other sensitive ecosystems. Sediment runoff can also deposit in built environments where it can contribute to flooding and infrastructure damage.

Engineers, geoscientists, and biologists play a key role in protecting the environment through design, development, implementation, and monitoring of ESC plans. Describing the expectations and obligations of professional registrants within professional practice guidelines will help support registrants of both regulators provide quality work that is protective of the environment. Engineers and Geoscientists BC and the College of Applied Biology are taking initial steps in the development of these new guidelines, which are expected to be completed in 2023. For information on the development of these guidelines or to participate in the guideline development process, contact Alice Kruchten, P.Eng., Practice Advisor, at *akruchten@egbc.ca*.

Professional practice guidelines and other practice-related resources are provided at *egbc.ca/Guidelines*.



NEW GUIDELINES ON FORMWORK, FALSEWORK, AND RESHORE FOR TEMPORARY STRUCTURES

Engineers and Geoscientists BC has published new professional practice guidelines on formwork, falsework, and reshore that provide guidance to engineering professionals who provide engineering services for these types of temporary structures.

These guidelines were developed for structural engineering work as it relates to the design and field review of formwork, falsework, and reshore for structures. The guidelines address the typical roles and responsibilities of engineering professionals working in this area of practice, and discuss the professional activities expected to be performed in order to achieve the basic level of service expected when providing formwork, falsework, and reshore design and field engineering services, including the services required to meet the WorkSafeBC Occupational Health and Safety Regulation.

These guidelines also clarify quality management expectations, provide a summary of legislative and regulatory requirements, and a contain a sample field review report.

These guidelines, and other professional practice guidelines and practice-related resources, are provided at *egbc.ca/Guidelines*.



What is Renewable Natural Gas (RNG)?



What makes RNG carbon neutral?



Where does RNG come from?



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REGISTATION FOR OCTOBER 30 VIRTUAL ANNUAL GENERAL MEETING CLOSING SOON

The 2021 Engineers and Geoscientists BC Annual General Meeting (AGM) will be held virtually on October 30, 2021, at 8:30 AM. The AGM is an opportunity for registrants to hear from Council and senior staff on the organization's strategic progress, key initiatives, and financial standing, and debate motions brought forward for Council's consideration. Beginning this year, Engineers and Geoscientists BC's more than 8,000 trainees (EITs and GITs) in good standing will now be eligible to vote on AGM motions.

All participants must pre-register by October 25, 2021 at 5 PM, to establish secure voting credentials for the virtual meeting. For more information or to register, visit *egbc.ca/agm*.



ANNUAL REGISTRATION RENEWAL IS COMING SOON

It's almost time to renew your registration for 2022. Here's what you need to know to complete your renewal.

HOW DO I RENEW?

Individual registrants can renew their registration beginning November 15, 2021 and must renew by December 31, 2021. For 2022, individual registrant fees will increase by \$10 to \$460. The fees for non-practicing registrants will be reduced to \$115 (25 percent of the fee for practicing registrants). To learn more, visit *egbc.ca/Fees*. Renew your registration by signing into your Engineers and Geoscience BC account at *egbc.ca/Account*, using your six-digit User ID number and password and pay your fees electronically. The December 31, 2021, renewal deadline also applies to registrants who submit their 2022 annual renewal invoice to their employers for payment. Please allow enough time for your employer to process your renewal. Registrants who have not paid their annual fee by December 31, 2021 will be subject to late fees, and those who have not renewed by January 31, 2022 will be struck off the register.

WHAT IF I WANT TO RESIGN?

If you wish to resign your license with Engineers and Geoscientists BC, be sure to do so before December 31, 2021, to avoid being liable for renewal fees. Resignation can be complete by signing into your Engineers and Geoscientists BC account, or by contacting Engineers and Geoscientists BC directly.

Resigned registrants can reapply for registration according to the organization's Return to Practice procedure. Engineers and geoscientists in training who reapply must comply with the Reinstatement Policy. Any outstanding annual registration fees, late fees, and associated administrative fees must also be paid before a registrant can be reinstated.



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¹ See full First-Time Applicant Offer eligibility and offer details at www.manulife.ca/newmember.

- ² Statistics Canada, "Household spending, Canada, regions and provinces," November 25, 2019.
 ³ CMUC "Mathematical Construction Conditional Department of A 2010." Proventing 2019.
- ³ CMHC, "Mortgage and Consumer Credit Trends National Report Q4 2019," December 2019. Underwritten by

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FEATURE

NATURAL ASSETS AND THE FUTURE OF ASSET MANAGEMENT

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A local government's management of physical assets that deliver services to residents is commonplace. But local governments are increasingly seeing natural assets as an important part of service delivery, and have started to quantify and manage them as part of their asset inventory.

PHOTO: COMOX VALLEY REGIONAL DISTRICT



EEATURE





The July 2021 professional practice guideline and the companion guide for natural assets.

n late July 2021, Engineers and Geoscientists BC issued a new Professional Practice Guideline titled Local Government Asset *Management*—a document guiding professionals in the management of local government assets. The term "local government assets" has traditionally meant physical assets-the kind that the Federation of Canadian Municipalities explained deliver "clean drinking water, transportation systems, waste management, drainage and flood protection, affordable housing, parks and recreation services." In short, a local asset is often an engineered or humanbuilt asset, like a water treatment plant, road, civic facility, or emergency vehicle.

While registrants frequently work with others at the local government level in the management (including the operations and maintenance) of these physical assets, the guideline *Local Government Asset Management* includes guidance on *natural* assets, like wetlands, forests, and aquifers. There's even a companion document devoted to the topic, authored by a Canadian not-for-profit called the Municipal Natural Assets Initiative (MNAI). The document, titled *Natural Assets Management Considerations for Engineering and Geoscience Professionals,*



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provides guidance on managing natural assets, and won the endorsement of Engineers and Geoscientists BC's Council.

Roy Brooke is MNAI's Executive Director. "Traditionally, local governments in Canada have considered natural assets at a social, green, or recreational level. These are important, but don't represent the full range of services that natural assets provide—or can be restored and rehabilitated to provide," he said.

The process begins with developing an inventory of natural assets, as though they were a physical asset. For example, an aquifer—a natural asset—that supplies water to residents is an inventoriable asset that would incur a quantifiable cost should it need to be replaced. MNAI's methodology includes determining the current capacity of natural assets, how levels of service might change with different management actions such as rehabilitation or restoration, and what it would cost to deliver the services via engineered assets.

"All of this can be calculated, which gives natural asset work real, tangible, and operational value. If I can link natural assets to services that you have to provide anyway, then you have to start thinking of seeing it as an asset," he said. The same is true for wetlands, forests, and creeks: they all provide tangible services to local governments that would otherwise have to be provided by built physical assets.

But expressing the value of natural assets in monetary terms is only part of the point. "Natural asset management is about broadening our understanding of nature and interacting with it in ways that preserve its health and biodiversity for the long-term, so that we can continue to benefit from the services it provides," he said. "Every day, local governments make a range of complex decisions, and it is important that that they have full evidence of how these decisions affect nature-based services to visitors, to Indigenous people, and to residents."

"We see two sets of values to services from nature: local government services, like stormwater management, drinking water supply, things of that sort are obviously important," said Brooke. "But there are a whole suite of other services, like cultural, social, identity, and recreational, and the health benefits to residents. Together, these two sets of numbers give us a sense of some minimum values of nature's services," he said.

Incorporating natural asset management into local government asset management activities is also an important step towards sustainable and ecological government operations-an element that has caught the imagination of post-secondary engineering students and their faculty. Dr. Susan Nesbit, P.Eng., Co-Director of UBC's Urban Systems Master of Engineering Leadership (MEL) program and a professor in UBC's Department of Civil Engineering, says that a course on asset management is regularly taught by Dr. Dana Vanier to Urban Systems MEL students; and this fall, natural asset management is the focus of her course entitled Environmental Stewardship and Civil Engineering, offered to undergraduate and graduate engineering students.

"I'm on cloud nine, because Roy and others are raising the bar—big time—in terms of urban sustainability," she said. "[Municipalities] are crucially important to accelerating sustainable development, and engineers are centrally involved."

Nesbit added that many engineering students are "a little scared" of climate change, and they want to be part of addressing it. "They care about sustainability, so they are super keen to learn about environmental



stewardship, and especially the effective management of natural assets that are providing municipal services while simultaneously helping people live within our planetary boundaries," she said.

The MNAI companion document points out that natural asset management is very closely connected to sustainability. "Sustainable service delivery requires an underlying ecosystem that is healthy, which in turn requires that it be a biodiverse ecosystem; and, biodiversity is linked to climate change mitigation and adaptation outcomes," states the guide.

The document points out that there are many "direct linkages between natural asset management and climate action." In a previous report, through case studies in the City of Nanaimo, the Town of Grand Forks, and the Region of Peel, MNAI noted that, under climate change and intensified development scenarios,



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F E A T U R E



the value of natural assets actually increased—mainly because natural assets showed a remarkable ability to adapt and absorb the pressures associated with climate change, development, and population growth—adaptation that classical physical assets did not show. According to Brooke, the Town of Gibsons is a leader in the field. The town is fortunate to possess an unusual number of natural assets, like the famous Gibsons Aquifer, a natural underground reservoir that provides water so pristine that it can be delivered directly to residents without

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additional filtration. Gibsons was one of the first municipalities to recognize that nature was delivering services that would otherwise require a built physical asset. So Gibsons incorporated its natural assets into its asset management planning, to help it manage risk, reduce costs, and maintain a healthy ecosystem. "They have done an outstanding job of considering natural assets in their core work," said Brooke. "So [MNAI] was created to refine. replicate, and scale up their approach across Canada. By the end of this year, we will have worked with about 90 local governments across Canada. This stuff is still in its infancy, but it's getting more traction because there's an increasing evidence base that natural assets provide vital services to local governments, and should be part of any asset evaluation."

Kristian La Rose, P.Eng., Senior Manager of Water and Wastewater Services for the Comox Valley Regional District (CVRD), has first-hand experience with both the benefits and challenges of managing natural assets. CVRD's key natural asset, the Comox Lake watershed, supplies drinking water to over 50,000 CVRD residents—but it has multiple uses and multiple owners.

"The lack of direct ownership/ control of the natural asset by local government highlights the need to work collaboratively towards protection of the asset in a way that doesn't usually exist for physical assets," he said. "Hydro power generation, fish habitat, recreation, forestry, cultural significance—natural assets can have overlapping interests. By inventorying and quantifying/qualifying those areas where our interests align with other stakeholders, we build capacity that can be used to reduce shared risks to the natural asset," he said.

But despite this additional complexity, La Rose thinks valuation of natural assets has an extraordinary upside—and it's



This analytics dashboard helps quantify and inventory natural assets.

altered how local governments think about assets and services in general. "We definitely see the value in the long run for valuing natural assets," he said. "The principle is that [natural assets] provide value that, if [the asset] is allowed to degrade, would severely compromise our ability to deliver the service."

We [the CVRD] have been at the table [with other stakeholders] working to start the process of valuing our key natural assets. The Watershed is our current priority, but over time the approach developed for this watershed is likely to be applied for other watersheds around the region and other types of natural assets."

Brooke thinks this change in thinking is bound to spread. "I think [natural asset management] is unquestionably a growing trend," he said. "I think we will have a very clear line of sight, maybe within a decade. This [approach to asset management] is applicable anywhere in the world. The fundamentals are the same." •



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PRESIDENT'S AWARDS

2021 PRESIDENT'S AWARDS RECIPIENTS

C. J. WESTERMAN MEMORIAL AWARD ROSS BEATY, P.GEO.



Throughout his 47-year career as a professional geoscientist, Ross Beaty, P.Geo., has been a leader in the international mining and renewable energy industries, making a significant and lasting impact in BC and around the world. Driven by his passion for people, communities, and nature, he has brought together the

worlds of mining and environmentalism to demonstrate that mining and environmental protection are not incompatible.

After graduating from UBC in 1979 with degrees in geology and law, Ross began a geological contracting company, Beaty Geological, which he operated from 1980 through 1987. In 1985, Ross established Equinox Resources, a public exploration and gold mining company. In 1994, Ross sold Equinox and founded Pan American Silver. Based in Vancouver, Pan American is now one of the world's largest silver mining companies with 10 operating mines in the Americas and over 12,000 employees. Between 1994 and 2017 Ross founded 11 other mineral exploration companies and a renewable energy company that has become one of Canada's largest independent power producers. In 2018, Ross began Equinox Gold, which now operates eight mines in the Americas with over 6,000 employees.

Through all his endeavours, Ross has been committed to sustainable development and high standards of environmental, social and governance practices. Ross's professional accomplishments are matched by his philanthropic efforts. In 2007 he established the Sitka Foundation with a mission to protect the environment and promote biodiversity. The Foundation partners with more than 70 Canadian and global environmental organizations focused on land conservation, education, scientific research and public policy in support of protection of the environment.

Ross is a true ambassador for the geoscience profession. His tireless vision, professional service, and philanthropic efforts have touched many in this province and brought incredible benefits to both British Columbia and the world.

R. A. MCLACHLAN MEMORIAL AWARD MARG LATHAM, P.ENG.



Marg Latham, P.Eng., was the only woman to graduate in civil engineering from Queen's University in 1974. Since then, she has continued to be a pioneer and trailblazer.

After graduation, Marg began managing multi-family residential construction projects, the only woman on these sites. In 1984, she joined UMA Group as a construction

superintendent on a \$50 million global system centre for the Royal Bank and went on to successfully deliver many major projects, including managing the construction of the Mississauga YMCA and the move of seven psychiatric hospitals to the newly built Psychealth Centre in Winnipeg.

In 1997, Marg moved to UMA's head office, first as director of quality systems, then as vice president of knowledge management—UMA's first female vice president—and later as vice president at AECOM. In these roles, she led ISO 9001 quality management implementation, industry-leading CADD standards and automation, and a Canada-wide health and safety program.

In 2010, she founded Aqua Libra Consulting focusing on professional practice, quality management and project delivery. In 2011, she was instrumental in helping to develop Engineers and Geoscientists BC's Organizational Quality Management Program. Since then, Marg has assisted over 200 organizations in becoming OQM Certified. She is now helping a number of major organizations assess practice gaps and develop Professional Practice Management Plans to improve professional practice and public safety.

Marg has also been a champion for women in engineering across Canada. She has volunteered with Engineers and Geoscientists BC for many years and served on the Women in Engineering Task Force. She was president of Canadian Construction Women from 2004 to 2006. In 2012, she became a director, and then chair in 2019, of the Canadian Centre for Women in Science, Engineering, Trades and Technology (WinSETT), leading the organization through the challenges of the pandemic.

Marg Latham is a role model, mentor, and leader whose commitment to project management, professional practice, and diversity and inclusion has made a lasting impact on the professions in BC. The President's Awards are British Columbia's top awards for professional engineers and professional geoscientists, which recognize outstanding professional, technical, and community contributions of Engineers and Geoscientists BC registrants. We are pleased to honour seven registrants with the following awards: the R. A. McLachlan Memorial Award, the C. J. Westermann Memorial Award, the Meritorious Achievement Award, the D. C. Lambert Professional Service Award, the Community Service Award, the Teaching Award of Excellence in Engineering and Geoscience Education, and the Young Professional Award.

MERITORIOUS ACHIEVEMENT AWARD DON FURSETH, P.ENG.



Don Furseth, P.Eng., is a technology commercialization veteran. He is a co-founder and director of Ideon Technologies Inc. (formerly CRM GeoTomography Technologies Inc.), a world pioneer in the application of cosmic-ray muon tomography.

Ideon has developed a discovery platform that integrates proprietary

detectors, imaging systems, inversion technologies, and artificial intelligence techniques to provide X-ray-like visibility up to one-kilometre beneath the earth's surface. By detecting subsurface muons and transforming the data into reliable geophysical surveys and 3-D density maps, Ideon helps geologists identify new mineral and metal deposits with precision and confidence. This helps geologists reduce costs and risk, save time, and minimize environmental impact.

Before Ideon, Don leveraged his experience from companies like MDA and Creo Inc. to become the founder and CEO of Acorn Solution Development Services, where he helped BC-based technology companies with multidisciplinary consumer or industrial products, focusing on clean technology and renewable energy companies.

In addition to his professional accomplishments, Don volunteers as a mentor with New Ventures BC, a non-profit organization that supports entrepreneurship in British Columbia's technology sector. Since 2008, he has contributed hundreds of hours and worked with more than a dozen BC start-ups, primarily in clean technology and software.

Don is a dedicated professional and a generous mentor, always upholding the principles of the Engineers and Geoscientists BC Code of Ethics, and sharing his skills and knowledge without reservation for the public good.

D. C. LAMBERT PROFESSIONAL SERVICE AWARD DIRK NYLAND, P.ENG.



Throughout his career, Dirk Nyland, P.Eng., has had a profound impact on professional engineering practice throughout his volunteer work with Engineers and Geoscientists BC and Engineers Canada. He has been a tireless advocate in promoting engineering best practices and raising

awareness about the need to adapt critical transportation infrastructure to the impacts of climate change.

Dirk was an outstanding volunteer with Engineers and Geoscientists BC for 16 years, undertaking registration interviews, performing Online Experience reviews for trainees, and serving on the Advisory Task Force on Corporate Practice. He also devoted hundreds of volunteer hours to Engineers Canada, working on the Public Infrastructure Engineering Vulnerability Committee (PIEV) and overseeing the development and testing of the PIEVC Protocol for highway infrastructure in BC. Dirk also worked with Engineers Canada to reach out to Northern and Indigenous communities to help raise awareness of climate change adaptation.

Dirk recently retired from his position as Chief Engineer of the BC Ministry of Transportation and Infrastructure after a 45-year career in the transportation engineering industry. He has been an outstanding leader and selfless volunteer, dedicating his career to engineering excellence, collaboration, and working to advance climate change adaptation in BC. He continues to make a positive impact in retirement, teaching courses developed by Engineers Canada now offered by the Climate Risk Institute, once again demonstrating his commitment to the safety and wellbeing of the people in British Columbia.

COMMUNITY SERVICE AWARD WAYNE WOLVERTON, P.ENG.



Over the past 40 years, Wayne Wolverton, P.Eng., has shared his multi-disciplinary talents in support of the Barnabus Family Ministries and the Camp Homewood Sailing Program.

Located on Keats Island, Barnabus Family Ministries is a Christian family camp and retreat. With no road access to the island, the camp

relies on dedicated volunteers to overcome the challenges of its location. Wayne has been an essential supporter of the camp, putting his ingenuity as an industrial electrical engineer to work in search of cost-effective solutions to the many challenges the camp has faced. He has designed, built, upgraded, and repaired electrical equipment, piers, and boats. He was the electrical Engineer of Record for the construction of the camp's multi-million-dollar main lodge. When preliminary studies showed that construction of a new facility would require a significant electrical upgrade to the property, Wayne volunteered to engineer that as well. He then spent hundreds of hours designing and facilitating a property-wide electrical infrastructure upgrade that not only provided power for the new building, but took into account the needs of the facility decades into the future.

Wayne also volunteers his time with the Camp Homewood Sailing Program, located on Quadra Island. He serves on the Sailing Advisory Committee and is Chair of the Maintenance Committee for Camp Homewood's sailing camp, which provides weeklong sailing adventures to youth.

In addition to his volunteer service to Barnabus Family Ministries, Wayne has served the engineering profession by providing training, coaching, and mentoring others in his specialized field. His willingness to patiently support other professionals is unmatched, and the high standards he sets for himself encourages others to do the same.

TEACHING AWARD OF EXCELLENCE **DR. STEPHANIE WILLERTH, P.ENG.**



Dr. Stephanie Willerth, P.Eng., joined UVic in 2010 as the school's first biomedical engineer. In 2012, she developed western Canada's first biomedical engineering (BME) program, which has been accredited by the Canadian Engineering Accreditation Board since 2016. The University of

Waterloo, McGill University, and UBC have developed undergraduate BME programs based on UVic's model.

Stephanie has also developed several courses at UVic, including a course on molecular and cellular physiology for engineering, a biomaterials and tissue engineering course, a bioprinting course, and a human factors and usability engineering for medical devices course—the latter of which includes collaboration with biomedical engineering companies.

Since the onset of Covid-19, Stephanie repurposed her lab to work with Vancouver Island Health Authority and with Starfish Medical in the Team Canada initiative with her engineering students to use her lab's 3-D printers to create medical-grade safety shields and other personal protective equipment critical to Canada's Covid-19 response.

Stephanie has been recognized by her students and UVic for her creative and engaging teaching methodology. Her leadership is inspiring the next generation of engineers and preparing them to meet the challenges and opportunities of the future.

YOUNG PROFESSIONAL AWARD DR. CONNOR LANGFORD, P.ENG.



Dr. Connor Langford, P.Eng., is a professional engineer with the Mott MacDonald Tunnels Group in Vancouver. He holds a doctorate in geological engineering with a focus on understanding uncertainty in geological conditions and risk management in underground construction.

Throughout his career,

Connor has proven to be a strong project engineer and project manager, which has led him to work on increasingly challenging projects and initiatives. These include Metro Vancouver's Capilano Main No.5 Stanley Park Water Supply Tunnel, where he was the design coordinator and project manager responsible for overall design and delivery; Coquitlam Intake Tower, as a project engineer for the detailed design of a seismic upgrade to the existing heritage landmark structure; and the Seattle Ship Canal Water Quality Project, as the project engineer responsible for risk management activities.

Connor actively and widely shares his knowledge and experience. He has been a member of Mott MacDonald's Early Career Professional committee, a member of the Board of Directors with the Tunnelling Association of Canada, a volunteer guest lecturer at UBC, a volunteer with Science World's Scientists and Innovators in Schools program, an undergraduate mentor, and co-author of several journal and conference papers about risk and reliability in underground design and construction.

Connor's passion and dedication to engineering, combined with his growing portfolio of accomplishments and willingness to give his time, energy, and skills to the engineering community, will see him emerge as a great leader and a true ambassador for the profession.

2021 SUSTAINABILITY, ENVIRONMENTAL, MENTOR OF THE YEAR AND FORESTRY AWARD RECIPIENTS

Engineers and Geoscientists BC is pleased to recognize outstanding individuals and projects in BC with the 2021 Sustainability, Environmental, and the Mentor of the Year awards, as well as the Forest Engineering Award of Excellence. These awards and their recipients will be profiled on our website and social media channels in October, along with the President's Awards.

SUSTAINABILITY AWARD - WILDEN LIVING LAB

The Wilden Living Lab (WLL) is a pioneering research initiative for sustainable homebuilding supported by NSERC and Mitacs. The WLL investigates how innovative materials and technologies can address energy-performance-based code requirements, such as the BC Energy Step Code, for new building construction. Currently in its second phase, WLL is developing a decision-making support framework and tools that integrate the requirements of the step code to assist builders and other stakeholders in constructing and maintaining economically feasible low-energy homes in the Okanagan and around the world. The project is led by Dr. Shahria Alam, P.Eng., the Director of UBC's Green Construction Research and Training Centre, in collaboration with Blenk Development Corp, FortisBC, AuthenTech Homes, and Okanagan College.

ENVIRONMENTAL AWARD - KEMESS SELEN-IX PLANT

The Kemess Selen-IX Plant is the first industrial-scale water treatment plant in the world to utilize the Selen-IX process technology to remove the selenate form of selenium from mine influenced waters. Developed by BQE Water, Selen-IX employs a physicochemical instead of biological method of treatment to address the growing environmental issue related to selenium toxicity, bioaccumulation, and its associated long-term environmental impacts. This is the first treatment plant to comply with an end-of-pipe selenium discharge limit without dilution, has zero risks of transforming selenium in the feed to highly bioaccumulative organoselenium in the treated water, and produces an inorganic stable selenium residue.

MENTOR OF THE YEAR AWARD - DR. HAMID GHANBARI, P.ENG.

Dr. Hamid Ghanbari, P.Eng., is helping to shape the next generation of engineers. Through Engineers and Geoscientists BC's Mentoring Program, he empowers his mentees to pursue their goals, provides them with guidance and advice, and connects them with industry contacts. Hamid is known for tailoring his communications style to meet the needs of his mentees, always making himself available for a quick phone call or a meeting. He is a strong advocate for skill development and growth, proactively sharing industry news, extending invites to attend community events or group meetings, and reminding his mentees of their commitments under Engineers and Geoscientists BC's Code of Ethics.

CONTINUES ON PAGE 37...

UNDER COVER DETECTIVES

Geoscience BC asked researchers, "How do you explore for deposits under cover?" Dave Sacco and Wayne Jackaman answered the question with a three-phased approach.

NICOLE D. BARLOW, P.GEO.



n British Columbia's Central Interior, a 300-kilometre zone is mysteriously lacking in mineral deposits, despite being underlain by a geological terrane known for economic copper-gold deposits. Palmer's Dave Sacco and Noble Exploration's Wayne Jackaman, in a project funded by Geoscience BC, are using geochemical reanalyses of archived samples, tailored surficial geology mapping, and next-generation till sampling to find out what lies under the thick layer of till.

When prospecting for mineral deposits, geologists traditionally look for outcropping bedrock, which provides clues about what the rock units are doing under the surface. A complication of exploring in BC is its history of glaciation, which means that much of the landscape is covered with overburden: till, glaciofluvial, glaciolacustrine, and modern sediments. The Central Interior Copper-Gold Research (CICGR) projects area has regions of unusually thick overburden, which is why it was targeted by Geoscience BC—a not-for-profit organization that funds independent and public geoscience research in BC. Brady Clift, P.Geo., Manager, Minerals at Geoscience BC, said, "There are no major mines through [this section of] the Quesnel Terrane, which is unusual, because if you go further north, further south, there are lots of deposits, lots of mines. So, the theory is that there's just too much glacial [sediment] covering the area." The Quesnel Terrane, one of BC's major geological terranes, is known for its porphyry copper-gold deposits, including some surrounding the CICGR area such as the Gibraltar and Mount Polley mines to the

Scrutinizing the material in a typical roadcut sample site to ensure it is suitable for sampling. Photo: WAYNE JACKAMAN



south and the Mount Milligan mine to the north, so it would follow that there could be deposits in the CICGR area.

Sacco answered Geoscience BC: "Surficial geologists know how to do exploration under cover . . . the key is really understanding what that cover is, and how we can use it to predict the composition of the underlying bedrock." Sacco, along with Jackaman, are spearheading the Central Interior Copper-Gold Research: Surficial Exploration Project, a multi-year project covering 20,000 square kilometres in this underexplored area.

Sacco and Jackaman began by leveraging previous work; 1,750 till samples were previously collected in the area and analyzed in the 1990s and 2000s by the Geological Survey of Canada, the BC Geological Survey, and previous Geoscience BC projects. The original analytical results, however, were not all comparable to the data being generated today because of advancements in geochemical analyses. These older data may have a higher minimum detection limit compared to modern methods, or different methods were used, and/or a different or incomplete suite of analytes were included. "You may end up with numbers that look the same, but they're just not comparable," said Clift. The organizations kept representative fractions of the samples, so they were reanalyzed to modern standards.

Geoscience BC and Jackaman have worked on reanalysis projects since 2006. Clift emphasized the importance of this initiative: "Reanalyzing these samples is valuable work. Part of the purpose of archiving the sample material after

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Concurrent with the reanalysis, the team completed surficial geology mapping for the project area. Sacco describes the imagery used as "pseudostereo imagery" because stereo pairs are generated from one orthophoto and a digital elevation model (DEM). The process shifts individual pixels based on slope and aspect, which provides a second viewing perspective, allowing 3-D interpretation. The team viewed the images in a digital environment, where they delineate material types and landform assemblages along with macroforms that indicate the ice flow and sediment transport directions. They also identified potential bedrock outcrops to support bedrock mapping and prospecting programs, as well as possible till sampling locations. This mapping provides context for the archived sample material and helps guide the design and execution of the sampling program.

Having gathered previous sample locations and armed with surficial geology interpretations for the area, the team headed to the field to infill the project areas with new till samples only to be confronted with COVID-19 restrictions in summer 2020. Sacco attributes last year's field season taking place due to Jackaman's logistical acumen. They established a small COVID working bubble, avoided sharing rooms, and were cautious when using public resources in small towns. Because of restrictions, they sampled only a fraction of what they planned for 2020.

With delays, however, there can be innovation, and Sacco and his team acquired and modified a specialized shallow drilling system for the summer 2021 field season. Originally designed for permafrost, they redesigned the drill tooling to handle the challenging conditions till presents. Typically, till sampling involves using a rock pick and hammer to dig a hole at least one metre deep to access unmodified till. The subglacial till that the team targeted was compressed by glaciers over one kilometre thick and can feel like concrete in the summer, according to Sacco. This process is laborious work; it can take several hours to collect one sample in a hand-dug pit. As such, the team looked for "opportunistic" sample sites, taking advantage of deep road cuts and avoiding difficult terrain, a common practice in till sampling. This approach, however,

can leave significant data gaps where opportunistic sites are sparse. With the drill, which is battery powered and can be moved easily by hand, collecting a sample takes about one hour and can be collected where till occurs at surface or is thinly overlain by other material. Till sampling with a drill has the potential to be revolutionary in this field because teams could collect samples more quickly and from optimal locations.

They are planning to collect up to 80 samples with the drill during summer 2021, filling gaps in the more difficult terrain that wasn't sampled last year. Even with the labour necessary to collect a sample, whether by drill or by hand, they will abandon a hole if they aren't sure the material will provide reliable results. "I think that the effort that we go through to ensure the appropriate material is sampled is beyond many other programs out there," said Sacco.



FEATURE



The Central Interior Copper-Gold Research area of interest. MAP Courtesy of Geoscience BC

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And what is this "appropriate material"? The team samples subglacial till, which is generally the first derivative of bedrock: the only process applied to the bedrock to generate the till is the glacier picking up the material, moving it along the direction of ice flow and putting it down. Sampling bedrock might be ideal, but till anomalies are generally large and continuous, which makes them very useful in finding an 'under cover' deposit. But there is an interpretation component that might require a shift in thinking for some geologists. Sacco says that when exploring under cover, "You can't just strip all the overburden; you need to figure out how to use it as a tool . . . It's knowing how to look at the data and understanding how to interpret the results from these materials, specifically [that] till is a transported material and that 'soil anomalies' do not occur directly over the deposit in most glaciated terrain." From a till anomaly, you have to search up-ice to find where the rocks that contribute to the till originated. The second phase, mapping the ice flow and sediment direction in the area, then becomes key to interpreting these samples. Sacco emphasizes the need for planning and strategy in accomplishing a project like this. "One of the biggest reasons that this is successful is because we take the time to do the [surficial geology] mapping first, so we already know what areas are going to be easy, what areas are going to cause some headaches, and what areas may be better suited to other methods."

The project is ongoing, with samples still being collected at the time of writing, and data quality remains paramount to Sacco and Jackaman. "The purpose of this project is really just to put high-quality data out there," said Sacco. They are doing just that, through both careful reanalysis and next-generation sampling procedures. As researchers access the project results, time will tell what can be found in the Central Interior Copper-Gold Research under thick cover. But according to Sacco, "[cover] is not just overburden; it's a dynamic tool for exploration." ◆

Find Sacco and Jackaman's final report in spring 2022 through the Geoscience BC website, at *www.geosciencebc.com*.

DISCIPLINE AND ENFORCEMEN<mark>T</mark>

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: LAURA FIDEL, P.ENG.

Engineers and Geoscientists BC issued a Notice of Inquiry on September 21, 2018 (amended June 22, 2020) to Laura Fidel, P.Eng., alleging unprofessional conduct and breaches of the Code of Ethics in relation to the engineering services Ms. Fidel provided at the Mount Polley tailings storage facility (the TSF) prior to its breach on August 4, 2014. A public discipline hearing proceeded in front of a panel of the Discipline Committee (the Panel) on July 6-17, 2020. The Panel issued its written decision on July 12, 2021.

Ms. Fidel was employed with AMEC. She acted as both the Engineer of Record (EOR) and Project Manager for the TSF starting in the spring of 2013 until taking leave from her position in February 2014.

The purpose of the Fidel discipline case was not to assess the cause of the breach of the TSF. The cause of the breach was separately addressed in reports prepared for the provincial government. The Panel considered the complexities and the inherent risks of the dam.

The Notice of Inquiry against Ms. Fidel set out numerous allegations over ten paragraphs. The paragraph numbering in this summary matches the allegations against Ms. Fidel. Some charges were proven while others were not.

The allegation was not proven that Ms. Fidel demonstrated unprofessional conduct when she undertook and accepted responsibility for the role of EOR for the TSF in circumstances where she was not qualified. The Panel found that in 2013, there was no comprehensive written definition that outlined the role and responsibilities of an EOR and there were no detailed references to the EOR position in the AMEC or the Mount Polley Mining Corporation (MPMC) documents. The Panel wrote, "Ms. Fidel was thrust into the EOR role in early 2013 by AMEC management, specifically Mr. [Stephen] Rice." The Panel raised concerns about the actions of AMEC, which was not a party to the discipline hearing, in appointing Ms. Fidel as EOR. The Panel wrote, "There is also no question that Ms. Fidel would not have been qualified at that point in time to undertake the EOR role as it is now broadly defined."

One Panel member wrote a dissenting opinion stating that in accepting the role of EOR, Ms. Fidel was in breach of Principle 2 of the former Code of Ethics which required Ms. Fidel to undertake and accept responsibility for assignments only when qualified by training or experience.

The Notice of Inquiry also alleged that Ms. Fidel demonstrated unprofessional conduct as she accepted professional responsibility for the Stage 9 2013 Construction Monitoring Manual in circumstances where she was not qualified. This charge was not proven. The Panel noted the conflicting expert reports, the lack of particularization of potential issues with the engineering work and the review of the manual by Mr. Rice.

With respect to Ms. Fidel's activities while acting as the EOR, certain allegations listed in the Notice of Inquiry were proven as unprofessional conduct, as Ms. Fidel:



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DISCIPLINE AND ENFORCEMENT

- 3 affixed her seal to the Stage 9 2013 Construction Monitoring Manual and Design Drawings, which were not prepared by her or under her direct supervision;
- 4 failed to ensure that there was sufficient observation and monitoring of the TSF embankments as she failed to:
 - visit the site and observe the embankments more than once in a thirteen-month period from January 2013 to February 2014;
 - ensure that a geotechnical engineer with appropriate experience and knowledge of the design of the embankments visited the site to observe the TSF embankments for potential indicators of safety or stability issues; and
 - request and review reports of seepage monitoring which may have provided evidence of a potential unsafe condition with the embankments such as piping;
- 6 became aware of an unfilled excavation at the toe of the perimeter embankment of the TSF but did not take steps at any time prior to commencing a leave from work in February 2014 to:
 - have an appropriately qualified geotechnical engineer assess the excavation to determine what impact it would have on the stability of the embankment;
 - b. determine the extent and purpose of the excavation and who authorized it; and
 - c. notify MPMC that the excavation was not in conformity with the Stage 9 Design.

The allegations at paragraphs 4(c) and 4(d) of the Notice of Inquiry relate to allegations that Ms. Fidel failed to receive regular updates on the volume and elevation of water in the TSF impoundment and to ensure that the implications of any changes to the water balance were assessed both in terms of stability and consequences if failure occurred. The Panel wrote, "More could most certainly have been done by Ms. Fidel to obtain and review such data" and "Ms. Fidel should have been more proactive on these matters." However, the Panel found that Ms. Fidel's actions did not rise to the level of unprofessional conduct.

The allegation at paragraph 4(f) was that Ms. Fidel failed to advise and warn MPMC that students should not be used as field inspectors. The Panel accepted that the practice used to monitor the TSF was unsatisfactory; however, the allegation did not constitute unprofessional conduct.

Paragraph 5 of the Notice of Inquiry related to an allegation that Ms. Fidel signed and sealed the 2012 Stage 8/8A As-Built Report which stated the embankment was "judged to have been carried out in conformity with design intent" when in fact the Stage 8/8A raise was constructed at a steeper slope and with a wider crest than was designed. The allegation was not proven. The Panel noted the historic divergence between construction and design with respect to the TSF, the involvement of the former engineers at AMEC in reviewing the as-builts, the apparent review of the as-built report by Mr. Rice and the manner in which the design intent was referred to in the document.

In conclusion, the allegations set out at paragraphs 3, 4(a), 4(b), 4(g) and 6 of the Notice of Inquiry were proven. The allegations set out at paragraphs 1, 2, 4(c), 4(d), 4(f) and 5 were dismissed. The allegation set out in paragraph 4(e) of the Notice of Inquiry was not pursued.

A hearing on penalty and costs will take place either by written submissions or by video conference, on a date and time to be arranged.

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

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DISCIPLINARY NOTICE: STEPHEN RICE

Engineers and Geoscientists BC issued a Notice of Inquiry on September 13, 2018 (amended April 18, 2020) to Stephen Rice, a former engineer, containing multiple allegations of unprofessional conduct and breaches of the Bylaws and Code of Ethics in relation to the engineering services Mr. Rice provided in connection with the Mount Polley tailings storage facility (the TSF) prior to its breach on August 4, 2014. A public discipline hearing proceeded in front of a panel of the Discipline Committee (the Panel) on June 15 and 18, 2020.

Mr. Rice resigned as a registrant of Engineers and Geoscientists BC in January 2018. At the hearing, Engineers and Geoscientists BC presented the Panel with an Agreed Statement of Facts, two expert reports, extracts from an investigative interview of Mr. Rice, and documentary evidence. Mr. Rice did not challenge or oppose any of the evidence or introduce any additional evidence.

In 2011, AMEC assumed engineering responsibility for the TSF. After the departure of the Engineer of Record (the EOR) at AMEC for the TSF at the end of 2012, Mr. Rice acted as the review engineer. Mr. Rice was the most senior AMEC engineer on the Mount Polley project and was in a position to select the engineer to be appointed as the EOR.

The purpose of the Rice discipline case was not to assess the cause of the breach of the TSF. The cause of the breach was separately addressed in reports prepared for the provincial government. The Panel considered the complexities and the inherent risks of the dam.

All allegations set out in the Notice of Inquiry were proven. Mr. Rice engaged in unprofessional conduct as:

- 1 from January 2013 to February 2014, when, as the most senior engineer at AMEC working on the TSF, Mr. Rice allowed Laura Fidel, P.Eng., a relatively junior engineer with little experience with embankment design, who had never previously acted as the EOR on a project, to act as the EOR for the TSF;
- 2(a) having allowed an engineer with insufficient experience and experience to act as the EOR for the TSF, Mr. Rice failed to ensure that a geotechnical engineer with appropriate experience and knowledge of the design of the embankments visited the site on a regular basis to observe the TSF for potential indicators of safety or stability issues;
- 2(b) Mr. Rice failed to ensure that he or the EOR warned Mount Polley Mining

Corporation that its field inspectors were not appropriately experienced or trained;

- 3 Mr. Rice accepted professional responsibility as the review engineer for the Stage 9 Design of the TSF embankments in circumstances where he was not qualified by training or experience to adequately fulfil that role;
- 4(a-c) Mr. Rice failed to properly fulfill the role of a review engineer, including by conducting a superficial review of the Stage 9 embankment design;
- 4(d) Mr. Rice failed to question the Stage 9 perimeter embankment design slope of 1.3H:1V which was unusually steep for rockfill tailings embankments of the kind at Mount Polley;
- 6 Mr. Rice failed to take appropriate steps after Ms. Fidel's departure from AMEC on a leave;
- 7 from March 2014 to August 2014, when he became aware of an excavation at the toe of the perimeter embankment that had remained unfilled for a number of months, Mr. Rice did not take steps to have an appropriately qualified geotechnical engineer assess the excavation and determine whether the excavation should be filled as soon as possible.

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



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Lee Deslauriers, P.Eng., RPF, Principal and Managing Engineer of StoneCroft Engineering, has over 25 years of experience working in the natural resource sector. His expertise involves the design and construction of resource sector infrastructure as well as development projects for First Nations, parks and recreation, mining, wind and hydropower, and pipelines. Lee's work consistently demonstrates his commitment to safety, environmental stewardship, and practical solutions for his clients.

In addition to his professional work, Lee is a volunteer with Engineers and Geoscientists BC in the Resource Sector

Division, the Association of BC Forest Professionals Joint Practice Board, and has co-authored several technical papers and professional practice guidelines. He brings high standards of personal and professional integrity to every project and is generous with his knowledge. The Forest Engineering Award of Excellence is a joint award with the Association of British Columbia Forest Professionals.

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N MEMORIAM

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

Arthur Antrobus, P.Eng. (Retired) Peter Ernest Bartlett, P.Eng. Andris Ints Betmanis, P.Eng (Non-Practising) Frank Joseph Cameron, P.Eng. Robert Hugh Cameron, P.Eng. (Non-Practising) John Douglas Carnahan, P.Eng. (Non-Practising) Wilkins W.L. Chan, P.Eng. (Non-Practising) Benjamin Colloby, P.Eng. (Retired) Robert Wellington Donaldson, P.Eng. Charles Robert Douglas, P.Eng. Kenneth Graham Farquharson, P.Eng. (Retired) Timothy Richard Forty, P.Eng. (Retired) Robert Gordon Gifford, P.Eng. Brian Mitchell Gunn, P.Eng. (Non-Practising) Donald Keith Hammond, P.Eng. (Non-Practising) Geoffrey William Hornby, P.Eng. Edwin William Hutchinson, P.Eng. Vlastislav Jasek, P.Eng. (Non-Practising) Andrew Tadeusz Jezierski, P.Eng. (Non-Practising) Kenneth Hartley Johnson, P.Eng. (Non-Practising) Alan Alexander Kay, P.Eng. Mohammed Zainul Abideen Khan, P.Eng. (Non-Practising) Ishrat Ali Khan, P.Eng. (Retired) Gordon Alvin Kotzer, P.Eng. (Non-Practising) Michael Christopher Lambert, P.Eng. (Non-Practising) Janis Lielmezs, P.Eng. Peter Ronald Maitland, P.Eng. Man-King Mok, P.Eng. Ronald William Palmer, P.Eng. Spencer Gerrit Postman, GIT Andres Alberto Quintero Rodriguez, P.Eng. Donald Gerald Riecken, P.Eng. (Non-Practising) John Paul Riley, P.Eng. Donald Charles Rotherham, P.Eng., FEC Rudolf Schwertner, P.Eng. (Non-Practising) Bension Shvartsoig, P.Eng. (Non-Practising) Peter Villanyi, P.Eng. (Non-Practising) Robert Warren Wilson, P.Eng. (Non-Practising) Fernando Zarate Lopez, P.Eng. Eckhard Zeidler, P.Eng. (Non-Practising)

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2021 VITRUAL ANNUAL CONFERENCE

October 27 and 28, 2021 | Engineers and Geoscientists BC's virtual annual conference will focus on education with up to 34 Continuing Education hours available through live presentations, breakout sessions, and two keynote addresses. The virtual nature of the conference is ideal for professionals working remotely and will also provide access and flexibility to registrants across the province. On-demand sessions will also be available to delegates after the event.

REGULATORY LEARNING MODULE FOR 2021-2022

As part of the Continuing Education (CE) Program, practising registrants must view this mandatory Regulatory Learning module in the current reporting year (July 1, 2021 to June 30, 2022) to meet their requirements. Non-practising registrants and trainees may also view the module and record it as a CE activity; non-practising registrants must view at least one module every three years. The first mandatory Regulatory Learning Module (egbc.ca/Regulatory-Learning) is now available for viewing and recording toward the first year CE Program requirements.

UPCOMING WEBINARS

FIVE DIMENSIONS OF AN AUTHENTIC LEADER October 18, 2021

The most impactful leaders demonstrate a passion for their purpose; they are driven by vision and connected to their values, while still being able to share their weaknesses and fears. Authentic leaders have the privilege to be transformational leaders who can motivate other people to leave their mark. They don't do this by emulating the style of other leaders. Instead, they have found a way to be more of themselves—but with more skill.

INTRODUCTION TO HYDROGEOLOGY AND GROUNDWATER MANAGEMENT

October 19, 2021

This seminar is tailored towards attendees who wish to have a better understanding of hydrogeological and groundwater management concepts. The course includes case studies, some hands-on exercises, and ample time for discussions and questions. Furthermore, a Groundwater Model will be on display (a tank in which water is being circulated by a pump, and dye is injected to visualize groundwater flow through different types of aquifer formation, interaction/connectivity between surface water and groundwater, and groundwater contamination principles).

HAVING DIFFICULT CONVERSATIONS FOR ENGINEERS AND GEOSCIENTISTS

November 1, 2021

Effective project management requires many conversations and relationships. Sometimes you have to tell people what you know they don't want to hear or sometimes you have to confront someone on their behaviour. What is the best way to deliver information that's hard to give and maintain an effective working relationships? In this half-day workshop, you will not only learn the best way to address difficult issues, but how to talk about it to increase the likelihood of success and practice these skills with your peers.

PROJECT CONSTRUCTION MANAGEMENT *November 1, 2021*

The purpose of this course is to build on the fundamentals of project management and contract administration and contractual issues for engineering and construction projects sessions also offered by Engineers and Geoscientists BC by focusing on the construction phase and its challenges with reference to major projects, cost overruns, safety, quality, and labour productivity.

DISTRIBUTED ENERGY RESOURCE INTERCONNECTION AND MICROGRID

November 2-5 and 16-19, 2021

This course is dedicated to exploring new challenges and opportunities introduced by the distributed energy resource (DER) interconnections to the existing utility network. The course will identify new transmission protection methodologies and new distribution protection philosophies permitting safe and reliable DER operations either in-parallel to utility grid or in MicroGrid mode.

COACHING FOR PERFORMANCE

November 4, 2021

This program provides the core management skills that maximize employee performance and engagement. It makes extensive use of skills practice using actual participant case studies in order to ensure relevance and prepare participants for critical conversations back on the job.

TEAM BUILDING ON ENGINEERING AND CONSTRUCTION PROJECTS

November 10, 2021

While the contract establishes the legal relationships, the team building and partnering process is designed to establish working relationships among the parties through a mutually developed formal strategy of commitment and communication. It 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.

ADVANCED MODELLING AND WATER MASTER PLANNING

November 16, 2021

Participants will be introduced to advanced topics like Extended Period Simulations, Water Quality Modelling, Demand Allocation, Model Calibration, and Planning System Improvements. To reinforce concepts learned during the course, participants will engage in hands-on EPANET tutorials for each section of the training.

CONTRACT ADMINISTRATION AND CONTRACTUAL ISSUES FOR ENGINEERING AND CONSTRUCTION PROJECTS

November 22, 2021

This session will cover legal and contractual issues related to the effective management and administration of construction projects. It focuses on the roles and responsibilities of the owners, contractors, and engineers.

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.

For a complete listing of online learning opportunities, or for more information, visit egbc.ca/Online-Offerings, or contact us at 604.430.8035 or 1.888.430.8035.

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