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THE PROFESSIONAL

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Assessing the Past, Preparing for the Future



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On the cover:



Meagan Gilbert is currently researching the Cypress Hills Formation in southwest Saskatchewan as she continues developing her understanding of how past life was impacted by climate change and what that could mean for the future.

Photo: David Stobb, University of Saskatchewan

Editorial provided by:

Martin Charlton Communications and APEGS staff
#300 - 1914 Hamilton Street, Regina, Saskatchewan S4P 3N6
T: (306) 584-1000, E: karen@martincharlton.ca

Design and Layout:

J. Lauder Publishing & Design, T: (306) 522-8461, E: joanne.lauder@sasktel.net

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Submissions to:

The Professional Edge
300 - 4581 Parliament Avenue, Regina SK S4W 0G3
T: (306) 525-9547 F: (306) 525-0851 Toll Free: 1- (800) 500-9547
E: apegss@apegs.ca

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President's Message



Kristen Darr, P. Geo.

It seems fitting that the theme for this issue is “Assessing the Past, Preparing for the Future.”

Many projects that engineers and geoscientists work on focus on the future, contributing to something brand new. But other projects require a solid understanding of what has occurred in order to know how to approach what is ahead.

Such is the case with those featured in this issue's articles. Whether participating in analyzing structures built 100 years ago or discovering evidence of activity that occurred millions of years ago, they have developed an understanding of what came before and what that means for what is ahead. Their contributions are making a difference for Saskatchewan going forward.

We are entering a time of year for APEGS when there is a lot to look forward to while also feeling positive as we reflect on what's been done.

The Annual Meeting and Professional Development Conference is just one reason to feel good about what is coming up for APEGS. Historically, this event has been an opportunity for members to meet face to face. This year, it is a hybrid event, which we are excited to offer members.

I'd like anyone wondering if they should participate to please take the time to review pages 27 to 33. There are really great opportunities for continued professional development, which is a mandatory requirement of members. Plus, it is an occasion to meet other professionals and to reflect on your career so far and what you have planned for your future, which is a win.

You can learn more about some of those who are active in this association by reading the biographies of those running for council in the nomination booklet emailed to you in March. The council election is around the corner and the nominating committee has successfully leveraged the new process to receive nominations and qualify the nominees to be put forward as candidates on the ballot. All candidates bring a unique perspective and would be a great addition to Council. Electronic voting begins on May 14, 2022 and closes April 11, 2022 at 5 p.m. CST. with the new council to be inducted at the annual meeting.

As we move towards the council election and the Annual Meeting and Professional Development Conference, it is nearing the end of my term as president of APEGS. As such, I would like to thank all of my fellow council members as well as the staff of APEGS for a great experience. There have been a lot of developments over the last year, including making significant progress on our governance work and thanking Bob McDonald for his service as he retired and welcoming Stormy Holmes in the role of Executive Director and Registrar.

I am very proud of the work that gets done by APEGS and to be a part of it along with some wonderful people. In the upcoming year, I look forward to sitting alongside the new president, John Desjarlais, P. Eng., at the council table. He is a phenomenal leader and I am excited to see him take over the reins as APEGS president.



Saskatchewan rock formations reveal past life, suggest future

Meagan Gilbert's interest in research was sparked when she recognized a gap in the data available from Saskatchewan compared to Alberta. Her work is helping people far beyond Saskatchewan understand how ancient life was impacted by climate change and what that could mean for our future.

BY MARTIN CHARLTON COMMUNICATIONS

Telling the story of ancient life in Saskatchewan and how those life forms were impacted by a changing climate is one that Meagan Gilbert, geologist-in-training, is uniquely qualified to tell.

It's a story that is unending. While her research in the southwest corner of the province contributes to our understanding of past life, it is also providing insight into what could occur in the future.

Her study of geology is key to her telling that story. Outside of her work as a resident geologist for the Saskatchewan Geological Survey doing economic geology, she continues her research into the Cypress Hills Formation, which she explains has a rich story to tell.

"I've kind of made a niche for myself," said Gilbert, who also serves as an adjunct professor at the University of Saskatchewan and teaches geology classes for Northland College.

"I look at the geology and then I look at the paleontology and I try to combine those things to come up with a more fulsome story of what was going on in some of these deposits, particularly throughout Saskatchewan.

"That's where I've made my career out of it."

Meagan Gilbert measuring gravelly river deposits north of the town of Eastend that are characteristic of the lower Cypress Hills Formation. Photo by Amanda Thimpson



Precambrian 2021: A photo of me teaching fieldschool in the Precambrian shield for the University of Saskatchewan in 2021. Photo by Amanda Thimpson

Inspired by southwest Saskatchewan

In years past, those interested in that type of story about ancient life might have looked for it here in Canada by going farther west.

“There are a lot of people who just find it interesting that there’s this kind of stuff in Saskatchewan and that you can tell these kinds of stories with deposits in Saskatchewan,” said Gilbert.

“Everybody thinks of Alberta when you think of prehistoric life. Not a lot of people think of Saskatchewan.”

Growing up in the Eastend area, Gilbert had some early experience with what could be found in that southwest region of the province.

“It’s pretty famous for being basically like a mecca for geological and paleontological activity,” said Gilbert.

“I grew up on a cattle ranch and there was a lot of outcrop exposure of what I would later come to understand are Paleogene deposits of the Ravenscrag and Cypress Hills formations.

“So, I could actually go out in the hills and observe the geology and make observations that, I didn’t realize at the time, were scientific in nature and prospect for fossils.

“I had an inherent interest, but it was fostered by living somewhere you could actually explore that.”

Recognizing her potential

Going from being a kid interested in rocks and fossils to becoming a respected researcher in her field is a compelling story on its own.

“I actually never really had any interest in pursuing academics,” said Gilbert.

“I happened to get a job at the T.rex Discovery Center (in Eastend) and I was mentored by some people there as a high school student.

“Eventually, I met the right people at the right time who encouraged me to go to university after I had already been graduated for a little while.

“It seemed like the logical thing to go to the University of Saskatchewan because they had a very reputable geology and paleontology program.”

Learning of a gap in research

She began her studies by pursuing a degree in paleobiology, which required her to take a variety of classes, including that which would become her preferred area to study – even though her love of it grew over time.

“I actually thought geology was the least interesting discipline of all the disciplines I was studying,” said Gilbert.



A small fragment of a left lower jaw from a small artiodactyl found at Anxiety Butte. An artiodactyl was from an even-toed hooved animal family that includes bison, deer, camels, and pigs. Photo by Meagan Gilbert

“But as I advanced and took more classes, it became my favourite. You had to take biology, archeology, and geology to get this paleobiology degree, and (geology) became what I found most interesting.”

During her geological studies, she learned about deposits from the late Cretaceous period in southwestern Saskatchewan. The Cretaceous period was 145 million to 65 million years ago. During this time period, North America was bisected from the Gulf of Mexico to the Arctic by an interior seaway known to Earth scientists as the Western Interior Seaway. The western margin of Saskatchewan sat along this shoreline, so any fluctuations in sea level were recorded in the rocks deposited during this time. Any plants or animals living along this ancient shoreline would be affected by rapid changes in sea level.

Gilbert was intrigued that these late Cretaceous period deposits in southwest Saskatchewan are the same age as those at Dinosaur Provincial Park, a UNESCO World Heritage Site in Alberta known for being where a number of high-quality dinosaur fossils were found in the Dinosaur Park Formation.

Seeking Saskatchewan data

Learning about the data from this area of Alberta, and recognizing the potential for that same type of data to be

collected in Saskatchewan, gave Gilbert an idea for her future. She spoke with a couple of professors at the University of Saskatchewan who study sedimentology and stratigraphy and explained her interest. Sedimentology is the study of sediments and the processes that result in their accumulation and formation, both in the modern day and in the geologic past. Stratigraphy is the study of the layers that result from the accumulation of sediments, which can be used to tell geologic time, or understand past environments.

They agreed to take her on as a master’s student. She continued her course work to gain the knowledge and skill she needed to conduct the research, including learning more about the geology of Saskatchewan. During her studies, she was “finding gaps in the record and wanting to fill those gaps in myself.”

As she was studying southwest Saskatchewan’s geology for her master’s degree, she came across a significant amount of microvertebrate sites. As she explains, these are hydrologically-controlled sites where the remains of disassociated animals accumulate, such as teeth, small bones, and scales. Finding thousands of bits of these organisms in one place suggests they lived at the same time, in the same space and in the same ecosystem.

“You can’t truly understand the geology without understanding the paleontology and vice versa. So, I was like, ‘Maybe I should just expand this, do a PhD and study this particular rock unit in three dimensions’,” said Gilbert.

“So, studying the sedimentology and stratigraphy and how that relates to the depositional environments and paleontology, and how that relates to paleoecology and the paleoclimate.”

She included in her research trace fossil evidence as it is “such a great barometer for understanding climates and depositional environments and subtle changes you might not pick up from the sedimentology alone.” Depositional environments are, in Gilbert’s words, “an accumulation of sediment controlled by all factors that would affect a modern environment.” Whether it is the site of a lake, river or ocean, each of those environments have their own particular types of sediments and features that are reflected in the rock record.

“To understand depositional environments (is) to measure and map the rocks and tease out all the details and use that evidence to figure out what environment those sediments would best fit into.”

From her research, she was able to use these types of environments as “a proxy for what happens to coastal environments during relative rises in sea level and how that affects the organisms that are living along those coastlines and results in faunal turnovers over geologic time.”



Meagan Gilbert standing at the top of Anxiety Butte, which is about five kilometres north of the town of Eastend. She is at the top of the Cypress Hills Formation. Photo by Amanda Thimpson

In the field

Gilbert collected thousands of fossils during her research, contributing them to the collection of the Royal Saskatchewan Museum. To do this work, she would apply for permits, getting permission to access remote sites in the southwest part of the province.

Some geologists speak of the severe conditions they experience doing field work in the northern part of the province, but Gilbert said the conditions can also be harsh in the southwestern parts of Saskatchewan as well.

“You’re in a massive community pasture where literally nobody lives for hundreds of kilometres and you can’t drive on the grass there,” said Gilbert, who now lives in La Ronge.

“You have to walk into these sites, so, just the feat of getting to some of these sites was almost insurmountable.”

She would have to hike out to field sites with equipment to bulk sample for the tiny fossils these sites contained.

“There’s a reason people maybe avoided studying some of these things,” said Gilbert.

Tying the past to today

So, what do her findings about the late Cretaceous period, when Saskatchewan had a fluctuating sea, mean for understanding changes occurring in modern times?

Today, there is concern about the changes in sea level and what that means for the future of those living on the coastlines. But Gilbert says that when sea levels change, evidence from the past shows the scale of the impact on animal life is not what one might expect.

“Essentially what this study did determine is that there are

changes in the fauna that live along these coastlines and it does affect them,” said Gilbert.

“But, at least at that point in time in the Late Cretaceous, it wasn’t affecting them to such a degree that it would have caused mass extinctions.

“You essentially end up with organisms shifting their patterns and shifting their environments and some might evolve or become extinct, but you don’t end up with these large-scale extinctions that you might expect there to be.”

Gilbert has since moved beyond that research to her current focus, which she says is even more relevant to modern times than what she learned studying the Dinosaur Park Formation. She is studying another time period – the Paleogene period which was from 66 million to 23 million years ago – with its own depositional environments by looking at another formation in Saskatchewan – the Cypress Hills Formation.

“I can’t overstate how important it is because there are very few deposits from the late Paleogene or the Paleogene in general throughout Canada,” said Gilbert.

“The Cypress Hills Formation has the only high-latitude non-Arctic fauna known from this time in North America.

The research I did in the Cretaceous (period) tells us about sea level change – and that’s important. “But the research that I’m doing in the Cypress Hills Formation actually tells us about major turnovers of entire groups of organisms.

“It’s capturing this very poignant time of major changes that is analogous with what we’re experiencing today with mammals.”

The Paleogene period followed the Cretaceous period. During the Paleogene period, the climate was changing significantly on a global scale with temperatures fluctuating by several degrees.

Earlier in that period, the area now known as southwest Saskatchewan was subtropical and forested, but as the climate cooled, grasslands appeared. Those grasslands are familiar to us in these modern times.

“All of that transition is recorded in the Cypress Hills Formation,” said Gilbert, who explained that particular formation spans about 28 million years.

“So, that is a really useful barometer for the things that we’re experiencing today and what we could be experiencing into the future,” said Gilbert.

What the past reveals

As the types of plants living in that area changed, so, too, did the types of animals. Gilbert explains that when the area was a patchy forest, the animals living there tended to be “really flat footed and have multiple toes.” There is evidence of those animals at the base of the Cypress Hills Formation, including the brontothere, which looked somewhat like a rhinoceros.

The depositional environments of the Cypress Hills Formation tell us that the environment was originally a patchy woodland but was evolving to be more like the Serengeti of Africa, with extreme seasonally wet and dry seasons. The animals living in what was becoming the plains of North America had to adapt to the evolving environments. When grasslands started to dominate the landscape, the animals living there evolved to be more like today’s horses, deer, bison and, even, camels.

“It’s more advantageous to reduce the number of toes and have longer legs for speed to evade predators who are more likely to see their prey in an open grasslands environment,” said Gilbert.

“The evolution of horses in the Cypress Hills Formation is a great example of that, who evolved from being the size of a medium-sized dog with three toes, to the long-legged, single-toed animals we know today that are built for speed.”

At the top of the Cypress Hills Formation, there is evidence of those animals there.

Explaining this transition in the types of animals living in that area over that period of time requires more than a single theory. But Gilbert explains that looking at individual types of animals from that time and place provides some insight.

Gilbert outlines a theory that explains the extinction of the brontothere. Their teeth were suitable for browsing shrub plants. As the climate changed, so, too, did the types of plants growing in that area. Grasslands appeared as the environment cooled. The soft enamel of the brontothere’s teeth was not equipped to handle eating grasses and their teeth wore down while they were still young, leading them to starve.

“Brontotheres are the most common fossil at the base of the Cypress Hills Formation, but by the top they are non-existent, and had gone completely extinct.”

Eventually, the ecological role brontotheres had, which was similar to the modern water buffalo in Africa, was filled by bison and other grazing animals. Horses and bison evolved high crowned teeth that can withstand the wear and tear grazing grasses places on teeth. Brontotheres were not able to adapt so quickly.

“That’s a small example of some of these faunal turnovers that you can see,” said Gilbert.

“If climate change is significant enough to have a huge effect on a continent, or even globally, you will see entire groups of organisms go extinct. Some organisms can’t adapt fast enough to whatever pressure is being put on them due to the resulting environmental and ecological changes caused by climate change,” said Gilbert.

“So, a combination of environment and an organism’s ability to adapt dictates whether they can survive or not. As organisms disappear, other groups will rise up and take over those niches left vacant by those that went extinct.”

Sharing southwest Saskatchewan’s story

Gilbert spoke at the joint annual meeting of the Geological Association of Canada (GAC) and the Mineralogical Association of Canada (MAC) in November 2021 explaining this story contained within the rocks of southwest Saskatchewan.

“This research has been very, very well received by the paleontology and geological community,” said Gilbert, who has collaborated with some paleontologists/curators on this research – Emily Bamforth (on the Cretaceous period research) and Frank McDougall and John Storer (on the Cypress Hills Formation research.)

“Probably the biggest thing that I bring is a slant on the geology. So, you know, we talked a lot about the fauna, but that’s only a very small part of the puzzle that I work on.”

Gilbert’s interest in research was sparked when she recognized a gap in the data available from Saskatchewan compared to Alberta. However, this current research on the Cypress Hills Formation will go beyond what has been accomplished in Alberta.

It will help to tell a bigger story than simply classifying animals found in a formation from a specific time period. It will contribute to explaining those animals’ experiences living through changes to their ecosystems and environment due to climate change. That understanding of the past can help us understand how organisms could be affected by climate change going into the future.



Going back to the ORIGINAL DESIGN

BY MARTIN CHARLTON COMMUNICATIONS

Every professional wants meaningful work to occupy their days. The same is true of those who volunteer their time.

Ensuring an element of Saskatoon's skyline remains in place for another 100 years has been a meaningful project for two retired engineers, who are both members of the same church congregation.

Anyone who has strolled along the South Saskatchewan River between 23rd Street and 24th Street East in Saskatoon could not miss The Cathedral of St. John the Evangelist. It has been a municipal heritage property since 2004, but that designation applies only to the building's exterior, which is an example of Gothic Revival architectural style.

The designation states the building is considered a city landmark, in part due to its orientation on its original lot and well as its spire, the tallest one on a church in Western Canada. During its construction in 1913, *The Star Phoenix* identified the building as "a source of pride to the entire city."

Character-defining elements of the structure include the fieldstone foundation, Redcliff (Alberta) brick exterior, the Tyndall stone (Manitoba) entrance steps, and the terracotta gargoyle over the south-east entrance, which is

believed to be the only one in Saskatoon. The terracotta trim used both outside and inside the cathedral originates from Doulton of Staffordshire in England.

Engineers as volunteers

What distinguishes engineers as volunteers, in part, is their dedication to solving problems. Robert Halliday, P.Eng., and Bert Munro, P.Eng., FEC, FGC (Hon.), have been dedicated for years to the project of restoring this cathedral. The project started around 12 years ago as the church was coming up on its centennial year.

Work to build the church had begun in 1912. In the decades since then, maintenance had been done but that was not going to be enough to ensure the structure would remain for generations to come.

The congregation and its leadership had to consider the building's future. Halliday was one of those parishioners, but he had more responsibility for the church property than others, being one of two church wardens for the Anglican church.

"I was what's known as the rector's warden, which is a



Before the gutters were fixed, the south side of the exterior of the church would be covered in ice. Photo courtesy Burt Munro.



Previous page: Anyone who has strolled along the South Saskatchewan River between 23rd Street and 24th Street East in Saskatoon could not miss The Cathedral of St. John the Evangelist. Bob Halliday, P.Eng., and Bert Munro, P.Eng., have been dedicated for years to the project of restoring this cathedral. The project started around 12 years ago as the church was coming up on its centennial year. Photo courtesy Robert Halliday, P.Eng.

Above: Photo courtesy PCL Construction

peculiarly Anglican title,” said Halliday, who explained that role meant he had responsibility for the church’s property, among other matters.

Halliday has been a volunteer with the project since the beginning when a decision was made to have the building envelope of the cathedral assessed. This would allow them to understand how the roof, walls, windows and foundation were performing and how that performance was related to what was being experienced inside the building.

“I really do believe that engineers – by nature and by training – see problems and try to solve them. And, so, it was a problem that needed addressing,” said Halliday, whose career was as a water resources engineer.

Getting the project going

A request for proposals was issued. Donations were accepted to help pay for this assessment, but a grant from the Frank and Ellen Remai Foundation was a significant reason this assessment was possible. (Halliday gives credit to Derwyn Crozier-Smith, another volunteer from the congregation, for that early funding that made this project possible.)

Vancouver-based Iredale Architecture won the proposal and did the assessment along with PCL Construction.

“We had them do a survey of the state of a cathedral which included things like digging test pits and opening up parts of the building to actually have a look,” said Halliday.

“It wasn’t just kind of a visual survey. It was a very intensive one.”

It was apparent that the building needed restoration and

not just some further maintenance, but not all of its needs had to be addressed at once. A list of priorities was developed to be done over time.

“I think the initial idea was it would cost about a million-and-a-half dollars to do all this work,” said Halliday.

“Here we are over 10 years in and we’ve spent \$3 million. Part of it is just finding stuff that you didn’t expect to find, but also we expanded the scope of work.”

Some of that grant money from the Remai Foundation was used early on to complete phase one of the project – which was improving the Tyndall stone steps at the front entry and rebuilding side roofs that had more than 100 rotten rafters. At that time, they added insulation to the roof as well.

But the main roof needed further attention as did the high gutter drainage system. Paying for that work was going to take further fundraising efforts.

Adding another perspective

Munro is another parishioner of the church. He had volunteered to help with fundraising, but as he entered his retirement years, he saw an opportunity to use the experience he had developed during his career as a consulting engineer.

Before retiring from his role as vice-president and general manager of the Saskatchewan and Manitoba regions for Associated Engineering, he had spent decades analyzing, designing, commissioning, and managing projects throughout Western Canada.

“I had a little more time and was able to bring some skill set forward that I knew could be of some benefit having a construction background and a building facilities background – although historical buildings are another cap altogether,” said Munro.

He identified many phases of work to be done.

“We weren’t keeping track in phases so much at the beginning. We were just doing stuff and then Bert put more structure on it,” said Halliday.

“We still have some brickwork re-pointing to work on, but it’ll be basically done at the end of phase five which we head into this spring.”

That work this spring will update not just the function of the roof, but its aesthetic. Shingles will be installed in a pattern that replicates the look they noted in a photograph of the building from 1917, when its original construction was completed.

While the restoration involves using modern building materials, such as those polymer slate shingles that come with a 50-year warranty, which will improve the performance of the roof, Halliday and Munro said the materials from the past are not to blame for the problems that developed.



Bert Munro, P.Eng., FEC, FGC
(Hon.)



Robert Halliday, P.Eng.

New shingles are to replicate a pattern noted in a 1917 photograph of The Cathedral of St. John the Evangelist. Photo courtesy Robert Halliday, P.Eng.

Appreciating the original design

Ensuring the building had another 100 years of life in it required referring back to the original design. The cathedral was designed by Thompson, Daniel and Colthurst, a Saskatoon-based architectural firm that operated between 1911 and 1914. All three architects – Norman Livingston Thompson, Thomas Brammall Daniel and Guy Buller Colthurst – had been trained in England before they emigrated to Saskatchewan and met one another, starting their firm. That background was evident in the design of the building.

“It’s very similar to St. Benedict church near Manchester, which was designed by the prominent architect John Crowther, and you know, English churches are designed for rain, not for snow and ice,” said Halliday.

But that doesn’t explain why the major portions of the restoration were necessary.

“The design was not the problem. It was the 100 years of ad hoc maintenance,” said Halliday.

“That’s an important thing from any engineering perspective. How was this designed to perform initially and what’s been done to maintain that kind of performance?”

“We decided to strip it right back down to the bones and start again. That was a key decision.”

“The fundamental thing we chose to do is take an asset-management approach to this,” said Munro.

“For the last 100 years, it’s been largely (an approach of) ‘Do what you can with what you have.’”

Over several decades, Munro said the maintenance that was done was to “fix it best you can with a bit of hay wire and binder twine, but with no sort of vision for how this fix will affect the next system in the overall building.”

For example, the gutters had been maintained, but that maintenance over the last 100 years had degraded their performance, which affects the foundation, walls and roof.

“Those gutters were filled year over year with tar and foam and screen and so, eventually what was happening is, the overflow on the gutters was the only thing that was actually operating to take the rain or meltwater away. Heat trace was put up there. (There were) all kinds of things that the original designers didn’t really plan for or intend.”

“It was one small fix over another small fix over another

small fix that finally wound up with a situation where the gutters were creating a problem in the walls,” said Munro. “The gutters as they stand now are restored to almost the original state with some improvements in materials and they are functioning beautifully.”

Appreciating earlier work

While doing that work to the system that protects the building from water, they noted that each downspout was its own ornamental feature on the building. That recognition was one example of many that made those working on the building appreciate the craftsmanship from the past.

“They must have had a platoon of sheet metal workers on the site doing this work,” said Halliday.

“When we came to restore it, our consultants had to scramble to find one person in the city who could duplicate what those people had done 100 years before.”

“A lot of that metal work is just remarkable when you think of how they did it in those days.”

Restoring this cathedral ensures that the vision that early citizens of Saskatoon had for their city continues. The efforts of the people from Saskatoon’s past can be experienced and appreciated by people today and those who come in the future.

“It’s absolutely remarkable what the original builders achieved with the materials and the technology that they had at the time,” said Munro.

“Every time we open something up or see something new, I’m absolutely impressed at how well they put it all together.”

“The most rewarding pieces of this for me is being able to sort of preserve what those people built in a way that some future generation will still be able to see it and understand it and enjoy it.”

Bringing in others

Restoring the gutters was crucial, but the appreciation for them was not universal. Understanding and appreciating the work that was necessary to restore the building was not always easy for those who were asked to donate funds.

“People were more excited about the \$10,000 we spent on refinishing the exterior doors than the \$100,000 or so we spent on some of the gutters,” said Munro.

“It’s what you can see and that’s a big piece of it. Unfortunately, so much of what had to be fixed here was stuff you don’t see.”

A comic once defined an engineer as someone who solves a problem you didn’t know you had in a way you don’t understand. But raising enough money to do this project was no joke to Halliday and Munro.

While the architect they worked with was accustomed to persuasively speaking to members of heritage committees and city staff, these engineers had to learn to effectively communicate about the project with parishioners and other community members in order to get them to financially support it.

“I have always said that Bert and I are not fundraisers, but I’d like to think we did a pretty fair crack at it,” said Halliday.

Building trust by explaining what was needed and why, and being true to their word about getting done what needed to be done, was important. This reputation made others more confident about providing funds and granting approvals.

“Most of this work has been undertaken based on funds in hand and that to me is a real sign of the commitment of the people that have been interested in the project,” said Munro.

Now, the benefits of this restoration are being felt by those using the church. Before gutters were fixed, when it rained outside in the summer, it also rained inside. People would have to bring out plastic sheets and buckets to protect the interior and collect water.

It used to be that during the winter, the south side of the exterior of the church was covered in ice. Inside, during December, it would get so cold that the Saskatoon Symphony Orchestra couldn’t practise as usual because the interior temperature was too low for their instruments.

“The next year there was no ice on the wall whatsoever at the same time of the year because the system is functioning properly,” said Munro.

Contributing to the community

The projects an engineer works on make them part of something larger than themselves. Reflecting on what is accomplished during and by the project and the time it takes to see a project through is a reminder of this.

Since this project began, the phases that have been completed over more than a decade of work covers all the priorities that were major expenses. What is left to start are smaller jobs, such as some brickwork that can be done over a number of years as well as interior painting.

“I’m not sure we could point to any modern building in Saskatoon that has been built to last 100 years. These old churches are quite remarkable in that respect,” said Halliday.

“In those days, when people went to church, they thought it was a forever building and I think we like to think that, too, but, we are at least good for another several decades.”



Preserving Saskatchewan Structures FOR THE FUTURE

BY MARTIN CHARLTON COMMUNICATIONS

The buildings that are restored are a physical representation of the decisions, aesthetics and efforts of those who came before us. To study history is to study change over time.

Brad Taylor, P.Eng., did not study history to become an engineer. He developed his technical knowledge and skills. But by working on projects that required he apply those skills in order for historic buildings to be restored, he has learned more about Saskatchewan's history.

His assessments have shown him first-hand the changes in how buildings were designed, constructed and renovated in this province during its earlier decades.

In the beginning

Taylor's career as a structural engineer began with a project that would help to preserve Canadian history here in Saskatchewan. When he started at JCK Engineering as a junior engineer around 12 years ago, he was asked to work

on its project at the Claybank Brick Plant National Historic Site. The site features a brick factory built in 1912 that allows visitors to appreciate an example of 20th-century industrial activity in Canada.

"I was specifically looking at the kilns, which include these really interesting dome structures," said Taylor.

"I met with one of the masons who had worked there in the past to understand how they built them, their methods, and the different materials that they were using."

"There are so many stories around Claybank that tell the story of southern Saskatchewan and tell the story of Saskatchewan's impact on the world. There's brick that's been used around the world from that factory."

The consulting firm Brad Taylor works for, JCK Engineering, did work on the College Avenue Campus Renewal Project. That project involved renovating the entire College Building and Tower, restoring the façade, and constructing two new structures on either end to fit the functional needs of the university. Photo courtesy JCK Engineering.



When Brad Taylor began his career as a junior structural engineer with JCK Engineering around 12 years ago, he was asked to work on its project at the Claybank Brick Plant National Historic Site. Photo courtesy Brad Taylor, P.Eng.

Some of those structures built with Claybank bricks include the Chateau Frontenac in Quebec City and the rocket launch pads at Cape Canaveral. Other bricks from this factory were used to line the fire boxes of CN and CP Rail locomotives as well as warships in Second World War.

From that project, he has moved on to be a part of numerous other projects restoring buildings that tell the story of Saskatchewan's earlier years as well as what is valued today, including Saskatchewan's Legislative building and the College Avenue Campus Renewal Project in Regina as well as the Yorkton Heritage Flour Mill.

Engineering and structures

Changes happen to buildings over time, in part, because of the forces that act on them. Taylor assesses buildings with an understanding of those forces, known as loads.

"Structural engineers are concerned with, essentially, taking the gravity loads and the lateral loads from wind down to the ground," said Taylor.

"We have to determine the loads and then we have to

make sure that the materials that we're relying on to transfer them down to the ground have enough strength and stability to do that."

Building loads include the self-weight of the structure, architectural finishes and the equipment. External loads include snow, water, wind and seismic loads that contribute to the stresses and deflection in the building.

Taylor assesses buildings to find out how they are holding up. In some ways, he sees similarities between his job and that of a physician. Someone responsible for an older building comes to him with issues the structure is experiencing, similar to a patient describing their symptoms to a physician.

"People will often call us when they see indications of movement or some cracks. Maybe a wall or column is leaning or there are noticeable deflections, which raises some flag in their mind," said Taylor.

"They know that they have some sort of issue here, but they don't know exactly what they're dealing with."

Assessing a historic building

Taylor uses his technical knowledge and skill to come up with a determination of what is occurring and how to address it. He does so by starting with the foundation of the building.

“In some instances, we will excavate around portions for the building to expose the foundations. We take core samples to determine the strength and durability of the concrete, or in some cases, brick,” said Taylor. While assessing the foundation, he can see how, in decades past, there wasn’t always a full appreciation for the type of soil found in the Regina area, where a number of restoration projects require underpinning (or strengthening) the foundation or repairing it to ensure the building is stable. Some of those doing the designing and constructing of Saskatchewan’s early buildings had come to the province from Eastern Canada or Europe, bringing with them methods that worked where they were from.

“We find often that some of those methods don’t really suit our soil conditions,” said Taylor.

He has worked on some stone and masonry churches that he found were built on very shallow foundations.

“Stone or masonry buildings with shallow foundations constructed on clay do not perform well in our environment,” said Taylor, which causes walls to move so they lean or crack.

Once the foundation has been assessed, he looks for water infiltration in the roof or the other parts of the building envelope.

“Moisture inside of wall cavities, especially masonry, are going to cause damage relatively quickly,” said Taylor.

The next step is to look for indications there has been movement in the building, such as deflection in the floors or leaning walls or columns. The assessment can also include testing the materials used in the construction of the building to determine their strengths while also ascertaining the actual loads to be applied to them to ensure the materials can handle them.

The safety of the building is affected by these factors. This structural safety is just one of the core objectives of the National Building Code, which Saskatchewan has adopted as the minimum standard for the construction and renovation of buildings throughout the province.

However, there was not a building code in place when some of Saskatchewan’s earliest buildings were constructed. Some of the construction he reviews was done based on best practices passed down from one generation to the next rather than regulated minimum requirements. (Although, to a degree, some of these best practices have been included in building codes.)

Change over time

Then, there are buildings that have been renovated through various eras, which may have included changes that do not complement earlier construction. For example, wall assemblies have changed over time. Early masonry

wall assemblies had very little insulation and did not include a vapour barrier. Air and moisture could move through the wall assembly, which, in some instances, improved the durability of the wall.

Some renovations of historic masonry buildings included the addition of more insulation and a vapour barrier. This may have improved the energy efficiency of the building, but restricting the flow of air through the masonry can cause other problems. Freeze-thaw damage can cause the masonry to deteriorate and connectors within the assembly may be more susceptible to corrosion.

Assessing work done in the past has taught him something important about humans. Some hold the opinion that work done by earlier generations is superior to what is being done by people today, but Taylor sees it differently as he collects examples of issues he’s encountered in older buildings. Masonry provides some of those examples.

“When you start digging into these buildings, you do find areas where adjustments had to be made because something was not constructed level or straight,” said Taylor.

“But they were not perfect either.

“There are masons today that are just as skilled and committed to quality workmanship as there were 100 years ago, and to some degree, the craftsman who are restoring these buildings require even greater skill.”

Working with clients

Deciding whether a building be demolished or restored is not a decision Taylor makes. That is the decision of the client, who has to decide if the building meets their strategic needs and fits within their budget.

“Often, we just say this is what you need to do and this is approximately what it’ll cost,” said Taylor.

“We’re just giving people the technical information so that they can make an informed decision.

“It is important that owners have a full understanding of a building’s condition so that they can make an informed decision and not run into surprises if they choose to restore a building.”

Combining old and new

Sometimes, the entire building can’t be restored, but a portion of it that has historic significance can be incorporated into new construction. That was the case with College Avenue Campus Renewal Project, which involved renovating the entire College Building and Tower, restoring the façade, and constructing two new structures on either end to fit the functional needs of the university.

“Façade retention projects are super interesting,” said Taylor.



Photo courtesy Allen Lefebvre



Brad Taylor, P.Eng.

“Historic buildings add to the beauty of our cities, towns, and landscapes. We would not be better off without them.”

“At the College Avenue Campus, we had this three-storey wall that had to be temporarily supported while the building behind it was demolished,” said Taylor.

Then the new building was constructed and tied into the façade.

“While it was temporarily supported, there were new foundations added below the façade, which include small excavations and working under the footings of the original building.”

Then there were modifications to the tower that included the of two large passageways through 51-inch-thick masonry walls, which carries “an incredible load.” New beams and columns were designed in such a way that allowed the openings to be constructed through the loaded walls.

“That’s very stressful work. It takes really good relationships with the tradespeople you are working with,” said Taylor.

Building relationships

“That’s a great thing we have in Saskatchewan with a lot of our tradespeople. They have a mindset of working together with the owners and the engineers.

“We have really good relationships in the industry, too,

with people that we trust and know that are going to do great work and are there to work with us. I know that’s a very important part of our success as a company.”

The importance of relationships in Saskatchewan is evident to Taylor and, through those relationships, he has recognized why people choose to spend on restorations, if they can acquire the necessary funds, through grants for heritage properties as well as other means, including fundraising.

His interactions with clients as well as with those he served alongside as a board member for Heritage Saskatchewan (where he was the only engineer) have helped him develop an appreciation for what these historic buildings symbolize.

“You learn about things that just blow your mind about how people survived in Saskatchewan and how they worked,” said Taylor.

“Most of the historic projects that we see are a testament to the hard-working spirit of people in Saskatchewan.”

The buildings that are restored are a physical representation of the decisions, aesthetics and efforts of those who came before us.

“These buildings are a part of who we are and that, I think, influences how we move forward,” said Taylor

Member Profile



M. Sikandar Nawaz, Engineer-in-training

I am from Rahim Yar Khan, Punjab, Pakistan, where I grew up as the oldest of three brothers. Rahim Yar Khan is a predominantly agricultural area having the beautiful swirling Indus River on the one side and a mesmerizing desert on the other side. I got my secondary and higher secondary education in my hometown.

Since childhood, I have been curious about the way things happen in nature as well as logical reasoning and cause-effect relationships. I broke apart all my toy cars to see what was happening inside.

As I grew older, physics became my favourite subject. I was fascinated by electromagnetic force, how energy is converted from one form to another as well as how power is generated and transmitted. All this led me to choose engineering as my career.

I pursued a degree in electronic engineering from the International Islamic University in Islamabad, having received a scholarship from Pakistan's Ministry of Information Technology and Telecommunication, (MoITT). I graduated in 2012.

Studying engineering was one of the best decisions of my life. During my studies, I realized that engineering is not only a knowledge domain. It is a mindset. It insists on logic and focuses on finding the solutions – not merely technical ones, but real-life ones as well.

I furthered my education by earning a Post Graduate Certificate in Business Administration in 2020. This certificate is from Allama Iqbal Open University in Islamabad in collaboration with the Commonwealth of Learning in Vancouver.

I have worked as an engineer in a total of five countries. I am a registered engineer in Pakistan, Saudi Arabia, Qatar and Canada. I was a resident of three of those countries.

In Saudi Arabia, I worked as an automation and instrumentation engineer in an engineering, procurement and construction firm. Then I moved to United Arab Emirates, where I worked as a senior automation engineer in another engineering firm. From there, I went to Oman and Iraq as well for the brief periods, handling projects.

Currently, I am working as a technical lead in a system integration firm in Doha, Qatar.

I am an International Society of Automation (ISA) recognized Certified Automation Professional (CAP®). This means that I have proven I possess an extensive knowledge of automation and controls and that I have the expertise and qualifications to excel in this field.

As a CAP, I have been working in the Industrial Automation Industry for almost 10 years. CAPs are responsible for direction, definition, design, development/application, deployment, documentation and support of software and equipment systems used in control systems, manufacturing information systems, systems integration, and operational consulting. I have worked on control systems and automation projects in infrastructure, water/wastewater, oil and gas and fertilizers.

Working in engineering is prestigious and rewarding but it also instils a great sense of responsibility for society and the environment. I appreciate the high-tech and sophisticated solutions we design, which build infrastructure, provide ease in people's lives and run the industry, producing commercial-scale food products, pharmaceuticals, fertilizers, and chemicals to name a few examples.

Gems Of Geoscience



Mikaela Miller, Geoscientist-in-training

I was born and raised in Saskatoon and grew up in a unique situation – with no siblings, a single father and a loving dog named Max. I was a shy kid who loved being outside, playing sports, and reading.

I completed all 12 years of elementary and high school in French immersion. I decided to stick close to home for university and attended the University of Saskatchewan from 2014 to 2018, graduating with a Bachelor of Science Honors Degree in Geology and a minor in Geomatics.

I have wanted to be a geologist since I was 11 years old. I still remember the day in Grade 6 when our class first started the rocks and minerals unit in science class. After that course, I was immediately hooked and ran home after school to begin what I considered my own geological research. As a kid, I made countless homemade textbooks that included facts on my favourite minerals, rocks, and volcanoes (which I still own to this day).

This passion for geoscience was fuelled through the numerous road trips with my dad to see different rock formations, mountains and volcanoes all over Canada and the United States. By the end of each trip, my dad and I would have collected a car full of interesting and unique rocks and bring them home to display in either the house or the backyard.

I aspired to be a volcanologist as my obsession with volcanoes just kept growing through the years. However, once I started university in 2014 and began speaking to professors and industry professionals about a career path in volcanology, that career path seemed more unattainable than I had previously expected.

In my final year of my undergraduate degree, I took the mineral deposits class of Dr. Kevin Ansdell, P.Geo., which sparked my newfound interest in mineral exploration. From then on, I decided I was more interested in a career in industry doing mineral exploration. Although I put my volcanology dreams on hiatus, I continue to fuel my obsession for volcanoes through travel, lots of reading, and following a great number of volcano pages on Instagram.

I have always enjoyed school and learning new things, so, once I was studying something I was passionate about, it made it that much more enjoyable. I appreciated the classes where we received hands-on experience and got to learn outside of a typical classroom setting, specifically, the labs and the two field schools I participated in Zortman, Mont. and Flin Flon, Man.

When I was a student, jobs were few and far between, so, when I got hired as a Geological Field Assistant with Appia Energy Corp. to work on their Alces Lake project in the summer of 2018, I was ecstatic. Even though I found myself up in northern Saskatchewan for three months straight with the worst bugs I've ever encountered, it did not diminish my passion for geology.

Afterwards, I went on to work for Orano Canada on the Getty-Russell project as a Geologist-in-Training from January to April in 2019. After my contract ended there, I found myself at Axiom Exploration Group in May 2019 and I am currently still employed there.

Since starting with Axiom, I have had the opportunity to work in countless commodities and deposit types such as Volcanogenic Massive Sulphide (VMS)-hosted copper and zinc, orogenic and sediment-hosted gold, and lithium-bearing pegmatites.

I believe starting to work at Axiom in 2019 was one of the greatest opportunities that could have happened to me. I get to work with individuals who are just as passionate and hard working as I am. I also get the opportunity and freedom to manage projects I am interested in while accessing the insight of all the experienced geoscientists around me.

I learn about all aspects of geoscience here at Axiom through our other three divisions; Geophysics and Remote Sensing, Environment, and Energy Services, which makes working here a unique experience.

The team atmosphere is nothing like any other place I've worked, and I look forward to seeing where we go in the future.

I am forever grateful for all the amazing experiences that I've had throughout my career in geology. I've had the pleasure of meeting many exceptional people, both at university and in the workplace. I love the fact that I get to travel all over the country (and get paid to do it!). Not everyone is able to have a career that allows them to stay active, fly in helicopters and float planes, and experience wild and remote places that few others have seen before the way that we do in mineral exploration.

I have many favourite rocks in my collection, but I think currently my favourite is this piece of pegmatite that I found while traversing on a property close to the Tanco mine in southeastern Manitoba.

The journey to bring this rock home consisted of an hour-long boat ride (one way) and a three-kilometre traverse just to reach the showing. We had been admiring photos and descriptions of the Silverleaf pegmatite for weeks, so we had high expectations and it did not disappoint. We spent upwards of two hours at this outcrop and blast pit admiring the huge spodumene crystals hosted in a fine-grained lepidolite groundmass.

I had never seen a rock like this before, so, once I came across it – after digging through a blast pile comparable to

Mount Everest – I knew I had to take it back with me, no matter the size or weight. We ended up taking so many personal samples that we had to prop our backpacks up on a higher outcrop just to get them on.

From all the samples I collected on that trip, this one is my favourite because of the unique botryoidal or “ball-peen” lepidolite hosted within the white cleavelandite (a platy variety of albite). It now sits at my desk at work for all to admire.



A sample of pegmatite that Mikaela Miller brought back from southeastern Manitoba.



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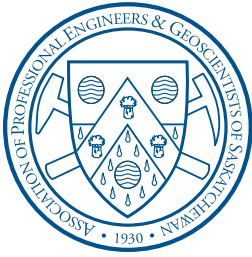
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Notes from APEGS Council



The APEGS Council held an in-person meeting with the option to participate virtually on Feb. 3 and 4, 2022 in Saskatoon, Sask. The meeting was attended by Council and the Directors to Engineers Canada and Geoscientists Canada. The next council meeting will be on March 30, 2022 through Teams as a special meeting to review audited financial statements.

Council received the following items:

- Executive Committee minutes of Jan. 13, 2022
- Governance Board minutes of Jan. 20, 2022
- Professionalism Board minutes of Jan. 19, 2022
- Regulatory Board minutes of Jan. 11, 2022
- Investigation Committee (Abridged) minutes of Jan. 14, 2022
- Discipline Committee have not met since November 2021
- Corporate Registrant Task Group minutes of Jan. 17, 2022
- Constituent Society Relationships Task Group minutes of Dec. 16, 2021 and Jan. 20, 2022
- Financial Statements October, November, December 2021
- Registrar's Report and Statistics and Applications Received – October revised) November and December 2021
- Regina Engineering Society report
- Saskatoon Engineering Society report
- Moose Jaw Engineering Society report
- Saskatchewan Geological Society report
- ACEC-SK report
- Engineers Canada report
- Geoscientists Canada report

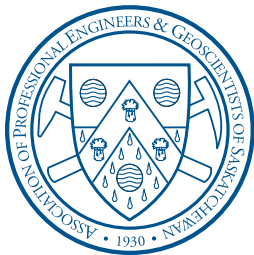
Council approved the following motions:

Approved the Guide for Licensee Applicants as revised in the agenda.

- Approved the LAC1.0 Licensee Eligibility Policy as revised.

- Approved the following random sample criteria to support the 2021 CPD Assurance Reviews:
- Members who reported their 2021 CPD prior to March 31, 2021.
- Members who had an approved remediation plan for 2021.
- Members who reported maximum credits in all categories.
- Members who reported their 2021 CPD after the deadline of Jan 31, 2022 (after receiving notices of non-conformance).
- Approved Life Member applications of 57 members.
- Approved the appointment of Paul Walsh to serve as a member of the Investigation Committee effective Feb. 3, 2022 until the annual meeting in 2025.
- Approved the Corporate Registrant Task Group's (CRTG) communications plan.
- Approved the amended project charter for the Constituent Society Relationships Task Group.
- Engage T. Bakkeli Consultants Inc. to provide research and support to the Constituent Society Relationships Task Group (CSRTG) as set out in the proposal.
- Approval to recommend repealing Appendix D contained in the Administrative Bylaws, to the membership at the 2021 annual meeting.
- Approval for APEGS to initiate a project to address and remove the age requirement for the Life Member category.
- Approved the recommendation to respond to the membership at the 2021 Annual Meeting to not create abbreviated titles for engineering/geoscience licensees.
- Approval to support the Engineers Canada recommendation to decrease the 2024 Per Capita Assessment fee to \$8 per registrant.
- Approval of the amended Admin 3.0 Expense Reimbursement Guideline.
- Update on the AMSOFT system replacement process.
- Update on APEGS strategic plan progress to date regarding objectives set out by Council.
- Review of the draft risk management framework and policy.
- Update on recent actions supporting the communications strategy.
- Update on the current compliance statistics and approach to enforcement.
- Disclosure of the new outline and approach to the 2021 annual report.

2022 Council Election



Notice of Candidates

The APEGs members listed below have been evaluated by the Nominating Committee. The Nominating Committee has determined that these members are qualified to run in the upcoming council elections. All have agreed to stand for election in the offices indicated. Voting will be done electronically unless otherwise requested by a member (see below) and will close on April 11, 2022. The new council will be inducted at the annual meeting to be held on Saturday, May 7, 2022.

Executive

President: John Desjarlais, P.Eng.
(one-year term) Great Plains Contracting, Regina

President-Elect: Greg Vogelsang, P.Eng.,
(one-year term) P.Geo., FEC, FGC
Edge Consulting, Regina

Vice-President: Nicholas Kaminski, P.Eng.
(one-year term) KGS Group, Regina

Erin Moss Tressel, P.Eng.,
P.Geo., FEC, FGC
NewFields Canada Mining and
Environment, Saskatoon

Penelope Popp, P.Eng.
Penelope Popp & Associates
Consulting, Regina

Members-at-Large: Rajeev Chadha, P.Eng.
(2 positions) Innovation Science and Economic
(three-year terms) Development ISED Canada, Saskatoon

Jared Galenzoski, P.Geo.
Nobel HSSE Management Ltd.,
Moose Jaw

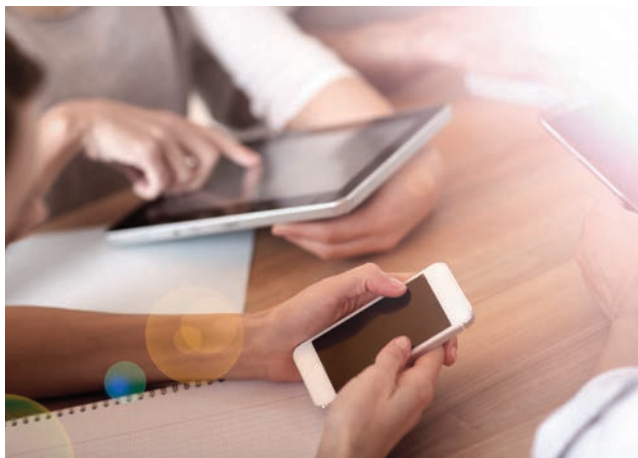
Jarid Hancock, P.Eng.
The Mosaic Company, Regina

Danae Lemieux, P.Eng.
Ministry of SaskBuilds and
Procurement, Government of
Saskatchewan, Regina

Kevin Ness, P.Eng.
AECOM Canada, Saskatoon

Mark Taylor, P.Eng.
Honey Bee Manufacturing Ltd.,
Climax, SK.

Sebastian Walrond, P.Eng., FEC
W4 Projects Services Inc., Regina



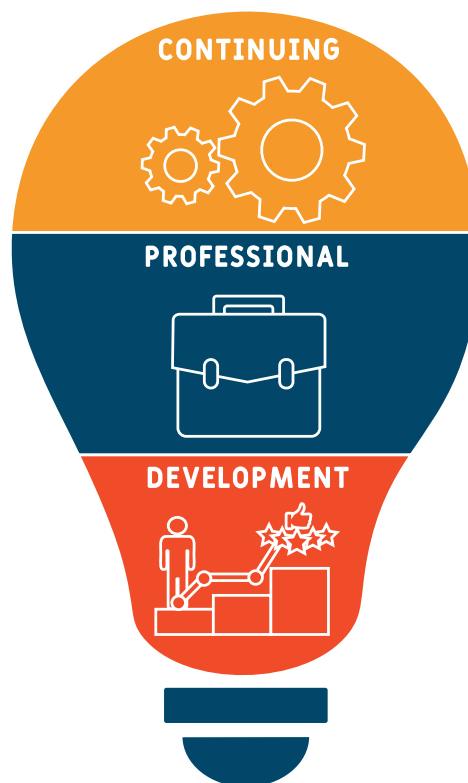
Watch for more information about voting electronically. A paper ballot package will be mailed to APEGs members who have specifically requested a paper ballot, those who have not provided us with an email address and those with an undeliverable email address. If you wish to change your ballot preferences for 2022, please log into APEGs Central and review your communications preferences under My Profile.

Continuing Professional Development

The Continuing Professional Development (CPD) Program requires APEGS members to complete ongoing professional development activities to maintain and improve their competence. It encourages members to engage in lifelong learning to protect public health, safety, and welfare. The program provides tools for members to assess their current skills, knowledge, and abilities, determine activities to maintain or enhance them and report completed activities online to APEGS as professional development credits. For more information, navigate to the CPD menu at apegs.ca.

2021 CPD Reporting Compliance Review Results

The deadline for members to report their 2021 CPD information to APEGS was Jan. 31, 2022. APEGS is pleased to say that compliance with the CPD Program is improving since the required reporting program began in 2019. Here's a look at the numbers as of February 1, 2022:



	2019 VALUE	2019 PER CENT	2020 VALUE	2020 PER CENT	2021 VALUE	2021 PER CENT
Members who reported No CPD	2,223	18%	3,498	26%	1,092	8%
Members who reported but not compliant	1,879	15%	1,635	12%	716	6%
Compliant	8,014	66%	8,090	61%	10,903	86%
Total Number of Records	12,132	100%	13,223	100%	12,711	100%

Reported but not compliant scenarios

YEAR	2019	2020	2021
Missing Credits, Categories & Ethics	46	73	27
Missing Credits and Categories	61	117	110
Missing Credits and Ethics	57	49	6
Missing Categories and Ethics	78	70	17
Missing Credits Only	94	145	129
Missing Categories Only	99	180	124
Missing Ethics Only	1376	940	303
Total	1811	1574	716

Featured Professional Development Opportunities

4 Seasons of Reconciliation – Indigenous Awareness Training

APEGS is introducing 4 Seasons of Reconciliation in partnership with the First Nations University of Canada. This online course provides an education in line with the Truth and Reconciliation Commission's 94 Calls to Action. The intent is to promote a renewed relationship between Indigenous Peoples and Canadian settlers through transformative multi-media learning.

Online Ethics Module #4 Launches in April

APEGS has free one-hour online ethics modules available to assist members in obtaining their ethics credit for the year. The modules are not mandatory and are offered as one option available to members.

Ethics Module #4 will be available to members in late April 2022.

Our current ethics module topics are:

Module 1 - Professionalism and Ethics

Module 2 - Conflict of Interest

Module 3 - Investigation and Discipline

For more information and to access the modules, please visit the CPD menu at apegs.ca.

Looking for More Professional Development Training?

Do you need help finding available professional development opportunities? The Professional Development Committee continuously sources professional development options which may be of interest to APEGS members.

Links to these courses are organized by industry and is available on the APEGS website. Visit the Professional Development Courses section under the CPD heading on the APEGS website for more details.

Free Course on Practical Geocommunication

Through Geoscientists Canada, APEGS has acquired a professional development opportunity which allows all members free access to Geologize's critically acclaimed course 'Practical Geocommunication' – a \$450 US per person value.

This 10-hour course has video lessons, quizzes, brief assignments and the opportunity to interact directly with

Dr. Haydon Mort, the course instructor, through forums. Launched on Jan. 5, 2022, the course is on-demand and available until Dec. 31, 2023. Members can sign up now and start at any point.

The geocommunications training helps geoscientists become more effective and powerful public ambassadors for geoscience. This skill is more important today than ever as professionals communicate with broad audiences about the effects and mitigation of climate change, impart knowledge concerning critical minerals, communicate with various stakeholder groups, inspire the next generation of geoscientists in the face of declining post-secondary geoscience enrolment; and so many other important topics.

How to Enrol

Get APEGS' unique access code by logging into APEGS Central, the self-serve portal, where you will see the code front and centre on the main screen in the news section.

Go to <https://training.geologize.org/courses/gc>

1. Click on "Member Access"
2. Register (Important - use an email address you have on record with APEGS)
3. On the payment screen, click the link 'Have a coupon?'
4. Enter coupon code (available on the APEGS Central newsfeed)
5. Click "Enroll Now"

The code is limited to use by the members of APEGS. Periodic checks will be made by the course developer to ensure the code is only being used by members. Those enrolled follow the course at their own pace, with the ability to save and continue at any point. A certificate is provided at the end of the course

Does Your Next Meeting Need an Ethics Topic?

Monthly ethics moments are available to APEGS members for use in meetings.

When an ethics moment is included in the minutes of a meeting, along with the start and end times of the ethics moment discussion, this time can count as part of the member's annual ethics requirement.

If you would like this month's ethics moment, please email cpd@apegs.ca.



A P E G S

*Association of Professional Engineers
& Geoscientists of Saskatchewan*

92nd Annual Meeting and Professional Development Conference

IN-PERSON AND VIRTUAL*

May 5 – 7, 2022

Delta Bessborough, Saskatoon, SK

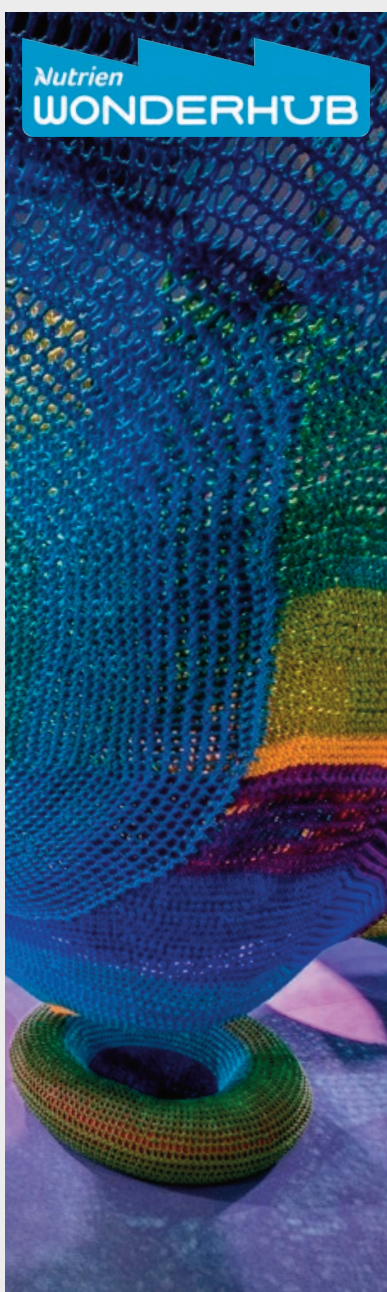
Registration is open from April 1 to April 28, 2022 at www.apegs.ca

TRANSFORMATION

Over the past two years, APEGs has been transforming our governance best practices and business processes. We will continue our work in recognition that there are always ways to improve and evolve.

Join APEGs on the journey of transformation as we report on our progress at the annual meeting and by attending professional development opportunities that explore our changing world and how we live and work in response.

*All events are in person (subject to change) with virtual attendance available for the annual meeting, the professional development sessions and the awards banquet.



Event Schedule

Thursday May 5

Welcome Event at Nutrien Wonderhub 6:00 pm - 10:00 pm

Friday, May 6

Buffet Breakfast 7:30 am - 8:40 am

Plenary Session Keynote: Kirsten Ketilson, P.Ag. 8:40 am - 9:45 am

Professional Development Track Sessions (morning) 10:00 am - 12:15 pm

Professional Development Luncheon Keynote: Jared A. Brock . . . 12:30 pm - 2:15 pm

Professional Development Track Sessions (afternoon) 2:30 pm - 4:45 pm

Past Presidents / Council Meeting 2:30 pm

President's Reception 5:00 pm - 7:00 pm

Saturday May 7

Buffet Breakfast 7:30 am - 9:00 am

Annual Meeting

Registration 8:30 am - 9:00 am

Meeting 9:00 am

Science Camp 8:30 am - 4:30 pm

Kids (ages 4-6) / Youth (ages 7-14)

Recognition Luncheon 12:30 pm - 2:30 pm

Awards Banquet

Reception 6:00 pm - 7:00 pm

Banquet 7:00 pm

Professional Development (IN-PERSON AND VIRTUAL)



Jared A. Brock

LUNCHEON KEYNOTE SPEAKER

Surviving Tomorrow: Re-engineering life in the face of democratic, ecological, and economic breakdown

BIO

Jared is an award-winning author and director of several films including PBS's "Redeeming Uncle Tom" with Danny Glover. He is the host of the Surviving Tomorrow podcast, and his writing has appeared in The Guardian, Esquire, Smithsonian, USA Today, Huffington Post, and TIME Magazine. He has travelled to more than 40 countries including North Korea, Transnistria, and the Vatican, and does not own a cellphone.

BREAKFAST PLENARY

Characterizing, Managing and Reporting on Environmental, Social and Governance Issues

Kirsten Ketilson, P.Ag.

BIO

Kirsten is a positive, passionate Professional Agrologist and Lean Six Sigma Black Belt with a Master of Science degree and over 20 years of experience managing, leading and collaborating with multidisciplinary teams in dynamic, fast-paced environments. She excels at problem solving by understanding clients' issues and needs and designing, co-ordinating, and executing effective solutions. She translates big ideas into actions and stays excited and engaged through the journey. She is an expert in climate, energy and environmental policy relevant to carbon and environmental impact assessment and has strong policy analysis skills.

	TRACK 1 Practising Geoscience and Engineering	TRACK 2 Practising the Professions	TRACK 3 Leadership & Engagement	TRACK 4 Transformation at APEGS / Ethics
8:00 – 9:45 am	Breakfast Plenary	Breakfast and presentation		
10:00 – 11:00	Update on Saskatchewan Resources Gavin Jensen	Urban Climate and City Design Dr. Iain D. Stewart	Embracing Change Part 1. Penny Popp	The Future of Corporate Entity Regulation Bert Munro
11:15 – 12:15	Mining Life Cycle Assessments Alex Grant, Laurens Tijsseling (virtual)	The Impacts of Workplace Injuries – They Are Larger Than You May Think Grant Van Eaton	Embracing Change Part 2. Penny Popp	Governance Transformation at APEGS Kristen Darr, Stormy Holmes
12:30 – 2:15	Luncheon Keynote	Lunch and presentation		
2:30 – 3:30	New Resources in Saskatchewan – Helium, Lithium, Cobalt, Nickel Panel presentation Andrew Davidson, Zach Maurer, Roger Lemaitre	Q & A with Jared Brock, Keynote Speaker	What is Duty to Consult and Accommodate ... and Why Should I Care? Tracy Campbell	7 Lenses of Ethical Leadership - Through the Kaleidoscope Linda Fisher Thornton
2:30 – 3:30	New Resources in Saskatchewan – Panel Q&A Continued from session 3. Moderator: Erik Nickel	Geothermal Power Generation in Southeast Saskatchewan Kirsten Marcia, P.Geo.	Interdisciplinary and Experiential Learning Opportunities with Engineering Adam McInnes, M.D., M.Sc.	7 Lenses of Ethical Leadership - Applying Ethical Thinking Linda Fisher Thornton

Professional Development Tracks

TRACK 1

Practising Geoscience and Engineering

Resource transformation: Discovering more of what Saskatchewan has to offer

Gavin Jensen, P.Geo.

ABSTRACT

This talk will illustrate the work completed by Saskatchewan Geological Survey to investigate the potential for developing new resources in the province, such as lithium and cobalt as well renewing the interest in a once-produced resource, helium. The interest for these resources are predominantly due to the strong projected growth of electrification of vehicles. Demand for numerous minerals associated with this sector has begun to rapidly expand and is projected to continue to grow over the next few decades. Additionally, all three minerals are included on the recently released list of Canada's critical minerals which are considered critical for the sustainable economic success of Canada and its role in the transition to a low-carbon economy.

Since April 2019 brine permit sales for the intent to produce lithium has generated 6.9 million dollars of revenue for the province. The focus of the presentation will be on the work completed by the survey for lithium exploration.

BIO

Gavin obtained a B.Sc. in Land Reclamation and Remediation, and a B.Sc. and M.Sc. in Geology all from the University of Alberta. He joined the Saskatchewan Geological Survey as a Research Petroleum Hydrogeologist in 2007. Since 2011 Gavin's focus area has been in determining the concentration and spatial distribution of lithium in brines. His research has helped guide and foster the growth and interest of this emerging industry within the province of Saskatchewan which led to the province's first subsurface mineral public offering for lithium in December 2019. Gavin's current research is aimed towards a collaboration with the University of Regina that is investigating regarding the presence and distribution of Rare Earth Elements (REE) in brines.

Mining Life Cycle Assessments

Alex Grant and Laurens Tijsseling

BIO

Alex is Principal at Jade Cove Partners. He is a Forbes 30 Under 30 honoree in Energy for 2021, and Partner at Minviro where he builds environmental impact models of lithium-ion battery supply chain processes. He is a technology innovation adviser at Zelandez, a lithium brinefield

services company with operations in Argentina, Bolivia, and Chile, and a research affiliate at Lawrence Berkeley National Laboratory. Alex co-founded Lilac Solutions, a Silicon Valley lithium extraction technology company funded by Bill Gates' Breakthrough Energy Ventures and others. Alex has an M.S. from Northwestern University in Chemical Engineering and a B.Eng. from McGill University in Chemical Engineering & Philosophy.

Laurens is the Sustainability Manager at Minviro, where he supports resource projects in development, mining operations and battery material end users to quantitatively understand the environmental impact of their own production processes and upstream and downstream supply chains. Prior to joining Minviro he worked as a process engineer and supported the world's largest cobalt mine to understand the impact of mineralogy on their metals recovery.

New Resources in Saskatchewan - Helium, Lithium, Cobalt, Nickel

Panel Presentation

Andrew Davidson, CPA
Zachary Maurer, Geoscientist-In-Training
Roger Lemaitre, P.Eng., P.Geo.

BIO

Andrew is the CEO of Royal Helium and is a resource development professional with more than a decade of continued experience in moving quality projects from greenfield exploration to production across multiple commodity types. As a founder of Royal Helium, Mr. Davidson is one of the most experienced helium exploration company executives in Canada.

A graduate of the University of Calgary (BComm), Mr. Davidson is a Chartered Professional Accountant with Certification in both Saskatchewan and Alberta. Mr. Davidson has extensive experience in the financial management and capital structuring aspects of companies in the junior resource markets in Canada. Mr. Davidson currently sits as a director for a number of junior natural resource exploration and production companies.

Zach is the CEO of Prairie Lithium and started work in Saskatchewan's energy sector in 2009 and worked his way from a roughneck into consulting roles. During his consulting career, he managed environmental and hydrogeologic projects in Canada and the United States. In 2019, he incorporated Prairie Lithium. He has since led multiple rounds of private equity funding and established Prairie Lithium as the first and largest active lithium brine developer in the region. He holds a B.Sc. in Geology from the University of Regina and is currently conducting M.Sc. research on lithium hydrochemistry in the Williston Basin. He also holds a Diploma in Exploration Information

Technology from the Southern Alberta Institute of Technology (SAIT).

Roger is the CEO of UEX Corp. and is an engineer and geologist with more than 20 years of professional experience, with both senior and junior mining companies. Before joining UEX, Mr. Lemaitre held the position of CEO and Executive Director of URU Metals Limited, an AIM-listed junior uranium and base metal exploration company, where he re-organized the company's asset mix by identifying and successfully acquiring significant new exploration projects. Prior to joining URU, Mr. Lemaitre held a variety of senior management positions with Cameco Corporation, one of the world's largest uranium producers, and was Cameco's Director of Worldwide Exploration Projects. In this position, Mr. Lemaitre had responsibility for overseeing the execution of Cameco's growing international exploration programs and budgets as well as overseeing the field activities of three global exploration offices. Before becoming the Director of Worldwide Exploration, Mr. Lemaitre was Cameco's Manager of Regional Exploration, Saskatchewan and was involved in Cameco's strategic growth team tasked with the identification of opportunities in the uranium sector. Mr. Lemaitre has a Master of Applied Science in Geology from McGill University, a Bachelor of Applied Science in Geological Engineering from Queens University and a Master of Business Administration from Athabasca University.

New Resources in Saskatchewan –

Panel Q&A

Andrew Davidson, CPA
Zachary Maurer, Geoscientist-In-Training
Roger Lemaitre, P.Eng., P.Geo.
Moderator: Erik Nickel, P.Geo.

BIO

Erik graduated from the University of Saskatchewan with a degree in Geology in 1994 and obtained his Master of Science in geology from the University of Regina in 2008. After a five-year tour as a wellsite geological consultant, Erik spent 15 years as a research geologist with the petroleum geology branch of the Saskatchewan Geological Survey (SGS). His research interests, while at the SGS, were primarily in the Mississippian carbonates of southeast Saskatchewan, performing some of the original Midale reservoir characterization for PTRC's Weyburn project starting in 2001. Erik also studied many other aspects of Saskatchewan's petroleum and natural gas resources, most notably an extensive body of work on the geology of Bakken tight oil reservoirs. Erik joined the PTRC in 2014 and is primarily responsible for the management and delivery of enhanced oil recovery research programs, including STEPS and HORNET, as well as managing the Centre's carbon capture and storage project (Aquistore).

TRACK 2

Practising the Professions

The impacts of workplace Injuries – they are larger than you may think

Grant Van Eaton

BIO

Grant has 41 years of service with the Saskatchewan Workers Compensation Board and is currently the Complex Injury Claims Specialist. His previous position was managing the Extended Services unit which is responsible for all aspects of work-related claims resulting in a fatality, catastrophic injury, cancer-related claims and more recently severe Covid work-related injuries. Prior to the Extended Services role, Grant's responsibilities over the last 13 years were around the initial acceptance or denial of all work-related claims for the province of Saskatchewan and the ongoing management of all long-term claims for the southern half of Saskatchewan as the Director of Operations South.

Urban Climate and City Design

Dr. Iain D. Stewart

BIO

Iain is a Research Associate at Ontario Tech University and a Fellow of the Global Cities Institute in Toronto. Iain holds a PhD in Geography from the University of British Columbia and is a specialist in urban climatology and climate-sensitive urban design. He is co-author of a textbook on the urban temperature effect, and a 2021 recipient of the Timothy Oke Award for Original Research in the Field of Urban Climatology, given by the International Association for Urban Climate.

Geothermal Power Generation in Southeast Saskatchewan

Kirsten Marcia, P.Geo.

ABSTRACT

The DEEP Earth Energy Production Corp. ("DEEP") geothermal power project is located in Southeastern Saskatchewan, a few kilometres north of the United States border within the Williston Basin. Successful geothermal resource exploration in a hot sedimentary aquifer (HSA) requires two main contributing factors: hot fluid in permeable rocks; and high well productivity. Modern well design has made sweeping the heat from the reservoir possible. DEEP developed a unique geothermal field design to maximize flow rates and optimize an important regional geothermal resource. DEEP's "ribcage" geothermal well field design is globally unique and may be a transformative application of modern oil and gas drilling, completions and stimulation design applied for the first time on a renewable energy project. The project is advancing with local world-class oilfield expertise and redeploying that uniquely skilled workforce into a new clean energy industry for Canada.

BIO

Kirsten is the founder of DEEP and its president and CEO. Kirsten is a geology graduate from the University of Saskatchewan, and she has worked in the exploration industry for 20 years in commodities including diamonds, gold, uranium and oil and gas.

Most recently, Kirsten was a recipient of the 2022 Canada's Clean50 award for her inspiring leadership in the Renewable Energy category.

Her past experience was focused in Saskatchewan and Alberta for Canadian TSX-listed companies including Wescan Goldfields Inc., Vena Resources and Shore Gold Inc.

TRACK 3

Leadership & Engagement

Embracing Change

Penelope Popp, P.Eng.

BIO

Penelope (Penny) is an accomplished leader, Professional Engineer and Project Management Professional with extensive experience building teams. Penny graduated from the University of Regina with her MBA and has an in-depth understanding and applied knowledge of leadership principles. Through her down-to-earth style and ability to tackle difficult issues, she both empowers individuals, while ensuring the oversight of organizations as complex systems. She is a certified practitioner of EQ-i 2.0 and EQ-i 360 assessments as well as a Certified Leadership Coach. Penny is an active member of the Project Management Institute and has a wealth of practical leadership, change and project management experience.

What is Duty to Consult and Accommodate ... and Why Should I Care?

Tracy Campbell

ABSTRACT

The Duty to Consult and Accommodate is the process to identify negative impacts and address them. Sounds simple, right? In fact, there are three main hurdles to protecting the rights held by Indigenous peoples in Saskatchewan, including treaty rights. First, most Canadians are unclear of the rights held by Indigenous peoples. Second, most Canadians are unclear of what constitutes an impact to those rights, and third, financial compensation to address impacts is not available. Understanding these hurdles will assist those involved in natural resource development projects, or those involved in the management of public resources.

This presentation will help you understand:

- What are the rights, including treaty and Aboriginal rights, existing in Saskatchewan?
- What constitutes an impact to treaty and Aboriginal rights?

- What do you do about impacts to rights once they are identified?

Understanding these three hurdles will assist professionals tasked with implementing a duty to consult and accommodation process.

BIO

As the Principal with Calliou Group, Tracy specializes in providing advice and support to Indigenous nations in their fight to protect their Section 35 rights, including within the Duty to Consult and Accommodate process. To be a trusted adviser in this space requires expertise in the fields of Section 35 rights, environmental assessment methodology, and regulatory review frameworks.

Tracy has more than 25 years of experience, assisting clients all across Canada when clarification of Canada's Treaty Relationship is required. She is a former partner with MNP LLP, former Chief Negotiator for the Government of the Northwest Territories, and former Consultation Manager, Ministry of Environment, for the Government of Alberta.

Interdisciplinary and Experiential Learning Opportunities with Engineering

Adam McInnes, M.D., M.Sc.

ABSTRACT

Engineering is a profession that is building the future, but it can't always go it alone. Collaboration with other professions brings together important insights and skills that are imperative to success. My journey in engaging with engineering began with joining engineering student groups and doing a research project while I was in medical school, expanded to starting companies that engage with and promote engineering, and now includes developing STEAM educational programs, in addition to doing graduate studies in biomedical engineering. My experience has shown me the importance of interdisciplinary and experiential learning and the importance of engineering in our world.

BIO

Adam is a PhD student and Vanier Scholar at the University of Saskatchewan where he is engaged in tissue engineering and regenerative medicine research. He is a strong advocate of interdisciplinary work and has sought out ways to engage with and promote the engineering discipline. This has included being a member of the University of Saskatchewan Space Design Team and SaskInvent while he was in medical school, helping to found the Canadian Space Technology Advocacy Group to promote space exploration and a health-care hackathon called Med.Hack(+) to develop technology for health care, and working to establish post-secondary educational opportunities that combine engineering and health. Further, Adam is currently working to build a STEAM education program for youth. Adam grew up on a small farm in southwestern Saskatchewan. He serves as president of Saskatoon Métis Local 126, supporting Métis post-secondary students, staff, and faculty in Saskatoon.

TRACK 4

Transformation at APEGS / Ethics

The Future of Corporate Entity Regulation

Bert Munro, P.Eng., FCSCE, FCSSE, FEC, FGC (Hon)
Chair, APEGS, Corporate Registrant Task Group

ABSTRACT

One of the recommendations resulting from the governance review that APEGS undertook in 2019 was for APEGS to consider changes to the requirements for corporate entity registration in Saskatchewan, commonly referred to as the Certificate of Authorization (CofA). The Corporate Registrant Task Group (CRTG) was formed to examine the regulation of corporate entities that engage in the practice of professional engineering or professional geoscience, including sole proprietors, and to provide recommendations on future requirements for CofA holders, PtoC, and any required bylaw revisions. This track session will provide an overview of the work of the CRTG to date and present possible recommended changes to the regulation of corporate entities. The CRTG will also be seeking input and feedback from the members in attendance, as stakeholders in this process, to be considered as the CRTG prepares their final recommendations to Council.

BIO

Bert retired as Vice President and General Manager with Associated Engineering and ATAP Infrastructure Management. He is a long-term holder of PtoC with responsibility for the CofA of several firms in multiple jurisdictions, and with over 40 years of experience in municipal infrastructure, buildings, and water resources engineering, project, asset, and business management. Bert continues to provide specialized advisory services and mentorship to engineers, planners, and former clients and to serve on the Boards of the Saskatoon Airport Authority and the Columbarium at St John's Cathedral, and as a Trustee University of Saskatchewan College of Engineering - Engineering Advancement Trust.

Bert is a Past President of the Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS).

Governance Transformation at APEGS

Kristen Darr, P.Geo.
Stormy Holmes, P.Eng., FEC, FGC (Hon.)

ABSTRACT

Join us to hear about the accomplishments of the Governance Change project and the status of implementation still underway. This will include the status of the Constituent Society Relationships Task Group and other plans APEGS has for continuous improvement as a regulator and why.

BIO

Kristen currently holds the position of Director, Environment & Sustainability with SaskEnergy in Regina, Sask. In this leadership role, Kristen is responsible for the Corporation's Environmental Management System, ensuring industry best practices are implemented into operational activities and regulatory compliance is achieved. Prior to SaskEnergy, Kristen began her career in the consulting industry. Primarily working in environmental and geotechnical areas, Kristen built a foundation of experience travelling throughout Northern Alberta and Saskatchewan conducting field work. This foundation allowed her to take on the responsibility of a variety of major projects as an Environmental Geoscientist and Project Manager later in her career.

Born and raised in Regina, Kristen is a professional geoscientist with a degree in Geography and Environmental Studies from the University of Victoria. Kristen is actively engaged with APEGS, currently serving as president.

Stormy is the Executive Director and Registrar with APEGS and for over 20 years has been an energetic volunteer committed to the engineering and geoscience professions. She has served two terms as a councillor and is a past-president. She served as Executive Sponsor for the Governance Review Project, which looked at APEGS governance structure and practices and from which 33 recommendations were identified. As Chair of the Governance Change Steering Group, Stormy worked with the consultant, steering group, and council to address each of the Governance Review 33 recommendations.

"7 Lenses" of Ethical Leadership

Linda Fisher Thornton

BIO

Linda is an innovative leadership development consultant with a passion for ethical leadership. Her book "7 Lenses" introduces a practical 7-Lens model for learning ethical leadership and seeing the nuances of ethical complexity. A former bank executive and now CEO of Leading in Context LLC, Linda has been in the leadership development field for over 25 years and is redefining leadership with the ethical values built in. She is on Inc. Magazine's Top 100 Leadership Speakers list and teaches applied ethics as adjunct associate professor for the University of Richmond. Her website is LeadinginContext.com.

Linda will be giving two presentations. They are designed to stand alone if you wish to attend only one.

7 Ethical Lenses: Through the Kaleidoscope

Professional challenges continue to increase in complexity, with the pandemic adding new ethical variables.

At the same time, traditional ethical decision-making processes have lacked the breadth and depth to guide ethical choices while meeting the needs of multiple stakeholders.

As a result, there is a critical need for a broader, higher-level process for ethical thinking and decision making.

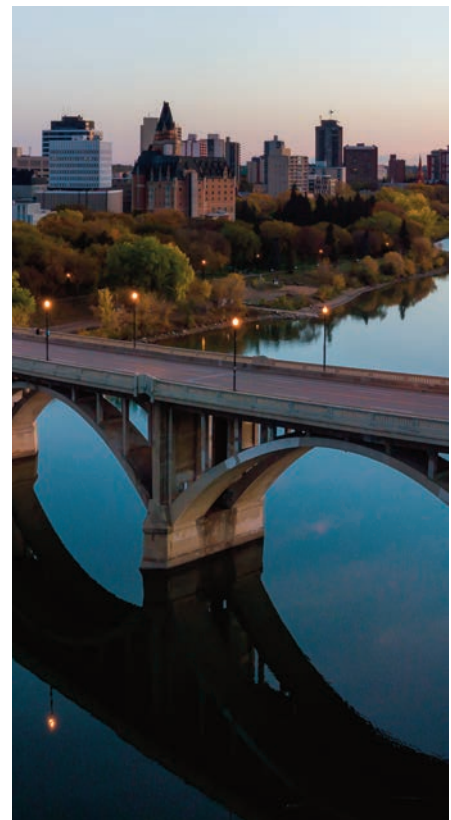
In this session, Linda Fisher Thornton, Author of "7 Lenses", will provide an in-depth review of her 7 Lenses model with seven perspectives for "seeing" ethical choices that provide a multidimensional view. Together the 7 Lenses provide a kaleidoscopic perspective on ethical responsibility and an eye-opening picture of what it means to "do the right thing." She will share an example to demonstrate how seeing a situation through all 7 Lenses reveals ethical nuances and guides us to make ethical choices that benefit a wide array of stakeholders.

7 Ethical Lenses: Applying Ethical Thinking

Having a robust ethical decision-making model is not enough; it is using it in real time that makes the difference.

In this session, Linda Fisher Thornton, Author of "7 Lenses", will briefly review her 7 Lenses model from the previous session that includes a continuum of seven perspectives for recognizing and thinking through complex ethical issues. Using this multi-lens schema takes the dialogue about responsibility to a higher level and leads to the kind of multistakeholder thinking that builds positive organizations and communities.

She will share a challenging situation that requires ethical thinking and participants will engage in a discussion as they apply all 7 Lenses to the situation together to see its ethical nuances. There will be time to discuss other possible applications of this model including areas where 7 Lenses thinking can be utilized.



Meeting for 2021

IN-PERSON AND VIRTUAL

Saturday, May 7, 2022

Check-in (for in-person attendees): 8:30 - 9:00 am

Meeting: 9:00 am

Delta Bessborough

Dress: Business

The Engineering and Geoscience Professions Act and associated bylaws require that the annual meeting of the association be held in the first six months of the year at a place in Saskatchewan determined by council. The 92nd Annual Meeting of the Association will be called to order at 9:00 am Saturday, May 7, 2022.

The meeting will be held in The Battleford Room Delta Bessborough, 601 Spadina Crescent E.

The agenda for the meeting includes, but is not limited to:

- Member and special guest acknowledgments
- Minutes from the 2021 Annual Meeting Business arising out of the minutes
- Message from the President
- Report from the Executive Director and Registrar
- Bylaw amendment
- Reports from boards and committees
- Audited financial reports
- New business
- 2022 election results



Awards Banquet

(IN-PERSON AND VIRTUAL)

Saturday, May 7, 2022

Reception: 6:00 pm

Banquet: 7:00 pm

\$50/person

Adam Ballroom

Dress: Semi-Formal or Formal Evening Wear

APEGS members have played a lead role in public safety and Saskatchewan's economic growth. Professional engineers and geoscientists are making contributions in every sector for the benefit of society, for the protection of the public and for the protection of the environment.

Saturday night we celebrate members whose outstanding contributions have earned them the recognition and respect of their peers. In the Friend of The Professions category we honour the exceptional contributions of non-members to our professions.

- Brian Eckel Distinguished Service Award
- Outstanding Achievement Award
- McCannel Award
- Exceptional Engineering/Geoscience Project Award
- Environmental Excellence Award
- Promising Member Award
- Friend of the Professions Award

In addition to this year's award recipients, we are including the 2020 and 2021 recipients, since we were unable to host a banquet for them at the time.

Changes to The Professional Edge

Since October 2021, APEGS has introduced a new website, APEGS Connect (the member survey platform), and social media, and we are continuing to transform the way we communicate with members and the public. The next step is to make changes to *The Professional Edge*. We will be reducing the print issues from six per year to two and supplementing them with monthly e-newsletters.

While digital communications are fast, easy, relevant, and affordable, print still plays a vital role in communications as a best practice. To strike a balance between the two, we will continue with print issues of *The Professional Edge* in May/June and November/December, and we will be

developing a plan to introduce an e-newsletter in August 2022. The intent is to provide members with timelier information while still providing the convenience and readability of print. We will continue to survey members adjusting our communications approach accordingly in keeping with communications best practices.

We trust that this approach considers the needs and preference of the members, while allowing APEGS to stay current in communications best practices and manage our human and financial resources responsibly.



A Brief History of Our Publications

May 1951 - The Association of Professional Engineers of Saskatchewan Newsletter (4 pages) was introduced.

November 1963 - The newsletter became The Association of Professional Engineers Saskatchewan Bulletin (4 pages).

September 1968 The bulletin became The Saskatchewan Professional Engineer (4-16 pages over 20 years).

March 1988 - The Saskatchewan Professional Engineer became The Professional Edge (8-12 pages).

Since then, more pages were added (up to 48 per issue) and there were six style changes before it became the magazine it is today.

Survey Says

A December 2021 survey of a representative sample of members through APEGS Connect found that 87 per cent of respondents support reducing the print issues of *The Professional Edge* to two per year.

Applicants Wanted

Do you know a student who is thinking about entering or already enrolled in engineering or geoscience in Saskatchewan?

Encourage them to apply for an applicable APEGS scholarship or bursary noted in the table below. Refer to each university's website for more information. Cut-off dates to apply vary by university, award type and field.

Scholarships recognizing leadership and volunteerism among university students currently enrolled.

Six scholarships of \$1,875 (three for each university) for current students of any field of engineering.

Two scholarships of \$1,875 (one for each university) for current students of any field of geoscience.

Scholarships aimed at female university students who are transferring their field of study to engineering or geoscience.

Two scholarships of \$3,200 (one for each university) for women in engineering.

Two scholarships of \$3,200 (one for each university) for women in geoscience.

Bursaries aimed at encouraging and assisting high school graduates entering the study of engineering or geoscience.

Two bursaries of \$4,000 (one for each university) to be applied towards first-year tuition in any field of engineering for a self-identified Indigenous student.

Two bursaries of \$4,000 (one for each university) to be applied towards first-year tuition in any field of engineering for a student of any background.

Two bursaries of \$3,000 (one for each university) to be applied towards first-year tuition in any field of geoscience for a self-identified Indigenous student.

Education Grants for Members



Through the University of Saskatchewan and the University of Regina, APEGS offers six merit-based grants of \$7,500 each to encourage existing APEGS members to further their education.

Eligibility requirements

Members returning to post-graduation studies at either university in the field of engineering or geoscience or for an MBA program are eligible to apply. Applicants are evaluated in the following areas:

- Accomplishments in the practice of professional engineering or professional geoscience that indicate exceptional potential.
- Demonstration of leadership, volunteerism and community involvement.
- Service to the professions in public education, understanding the role of professionals in society and/or active participation in engineering/geoscience associations, societies and institutes.

- Reasons for pursuing the post-graduate degree, goals, personal statement and how their studies will contribute to the professions.

How to Apply

Applications may be sent to APEGS any time throughout the year. Applications received by Dec. 31 of each year are considered and awarded early the following year with presentations made at APEGS' annual awards banquet, typically in early May of each year. Visit apegs.ca for the application form and more information.

Celebrating Our Own



Frank Simpson, P.Eng., P.Geo.

Frank Simpson

Frank Simpson, P.Eng., P.Geo., has been awarded the Decoration of Honour for Merit to Polish Geology.

He is a professor emeritus at the University of Windsor's School of the Environment

The award is from Poland's Minister of Climate and the Environment.

Dr. Simpson has been an editor of the Polish Geological Society's journal *Annales Societatis Geologorum Poloniae* since 2012. He, along with 10 other editors of this journal, received the honour in 2021 on the occasion of the society's 100th anniversary.

Simpson has written research papers about the geology of part of the Polish Western Carpathian Mountains. He has translated from Polish to English numerous papers by geologists from universities and government organizations in different parts of Poland.

Simpson appreciates that he received this award alongside other individuals whose work he knows and admires.

The award came in response to a recommendation from the president of the Polish Geological Society. The minister signed the document of proof that goes with the decoration just two days before Simpson began his retirement. A presentation ceremony will be held in May.

University of Saskatchewan



Dr. Kathryn McWilliams, P.Eng.

unquestioned international expert in the dynamics of field-aligned currents that link the solar wind, magnetosphere and ionosphere."

She was also the first tenured female faculty member in the Department of Physics and Engineering Physics.

McWilliams has dedicated most of her career to the SuperDARN project. SuperDARN Canada is the Canadian arm of an international project that uses radar to study Earth's upper atmosphere. In 2019, she was elected chair of the SuperDARN Executive Council, the group responsible for leading the scientific collaboration among 10 countries. She first became involved with SuperDARN Canada as a summer student in 1992, when she helped build the first radar site east of Saskatoon.

The RAS awards honorary fellowships to scientists living outside the U.K. who are eminent in the fields of astronomy or geophysics. McWilliams said she feels "humbled and honoured" to receive the award.

Dr. Kathryn McWilliams

University of Saskatchewan (USask) researcher Dr. Kathryn McWilliams, P.Eng., has been awarded an honorary fellowship from the Royal Astronomical Society (RAS) of the United Kingdom.

McWilliams is the first Canadian to receive the honour. The RAS acknowledged in its announcement that

McWilliams as "an

APEGS Office Reopening

The APEGS office reopened on March 1, 2022, after being closed to the public since March 23, 2020 due to the COVID-19 pandemic.

We look forward to serving you in person again. Walk-ins are welcome, though making an appointment before coming to the office will ensure the appropriate staff member is available.

APEGS follows the Government of Saskatchewan public health measures and orders, so please stay up to date on the current health measures and orders at www.saskatchewan.ca. If you are not feeling well, please do not come to the office.

Thank you for your understanding and patience throughout the pandemic.

Our Newest Professional Members

Join our 15,000 members in congratulating our newest professional members – dedicated professionals who have completed a minimum of eight years of university study and work experience to earn the designation of Professional Engineer (P.Eng.), Professional Geoscientist (P.Geo.), Engineering Licensee or Geoscience Licensee. Pictured below are some of the 1,000 professionals who have received their licence to practise engineering or geoscience in Saskatchewan in the past year.



Ajayi, Mark, P.Eng.



Aliyu, Adeyemi K.,
P.Eng.



Angala, Christopher M.,
P.Eng.



Aribi, Sunday, P.Eng.



Belyk-Kaytor, Rayna,
P.Eng.



Bogeovski, Zlatko,
P.Eng.



Brauner, Haley L.,
P.Eng.



Chabot, Robert M.,
P.Eng.



Chuhanuiuk, Spencer M.,
P.Eng.



Dae, Ben B., P.Eng.



Dueck, Clifford, P.Eng.



ElMaamoun, Mohamed,
P.Eng.



Esenwa, Michael N.,
P.Eng.



Fairgrieve, Angus,
P.Eng.



Fedorchuk, Ethan E.,
P.Eng.



Garapati, Harikumar,
P.Eng.



Gettis, Jim, P.Eng.



Haeusler, Drew L.,
P.Eng.



Henry, Richard B.,
P.Eng.



Hwang, Hyunjin, P.Eng.



Ibikunle, Oluwbenga S.,
P.Eng.



Ishac, Magdi F., P.Eng.



Ito, Maki, Engineering
Licensee



Li, Qingbin,
Engineering Licensee

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Lian, Litao, Engineering Licensee



Liang, Rong, P.Geo.



Loi, Cosme, P.Eng.



MacDonald, Sean T., P.Eng.



Mascarenhas, Audrey, P.Eng.



Mayes, Logan P., P.Eng.



McAlpine, Steven, P.Eng.



Melese, Eskedil A., P.Eng.



Mueller, Terry, Engineering Licensee



Osmak, Christopher J., P.Geo.



Parab, Vinay, P.Eng.



Parekh, Sulay K., P.Eng.



Parlee, Sepideh, P.Eng.



Punjwani, Sharmeen F., P.Eng.



Qiu, Biaon, P.Eng.



Rathgaber, Melissa M., P.Eng.



Schindel, Darin K., Engineering Licensee



Schnare, Louise, P.Geo.



Shamim, Moeed, P.Eng.



Shaw, Stacie, P.Eng.



Singh, Sukhwinder, P.Eng.



Soliman, Haithem, P.Eng.



Specht, Thomas, P.Eng.



Squire, Leslie, P.Eng.



Thoman, Glen, P.Eng.



Tran, Trieu H., P.Eng.



Turk, Logan J., P.Eng.



Veter, Paul E., P.Eng.



Williams, Brett A., P.Geo.



Wong, Tony K.M., P.Eng.



Woroniuk, Bradley, Engineering Licensee



Xu, Qin, P.Geo.



Yang, Jingsi, P.Eng.



Zaidi, Syed A.H., P.Eng.



A P E G S

*Association of Professional Engineers
& Geoscientists of Saskatchewan*

News From The Field



Wastewater testing for COVID-19 finding its future

USask – Since the arrival of COVID-19 in Saskatchewan, University of Saskatchewan (USask) researchers Drs. Kerry McPhedran, P.Eng., John Giesy and Markus Brinkmann have been measuring concentrations of RNA molecules in wastewater in a number of Saskatchewan communities.

Those communities are Saskatoon, Prince Albert, North Battleford, and five First Nations communities as well as USask's student residences. McPhedran, Giesy and Brinkmann's team includes toxicologist Dr. Paul Jones (PhD), USask Toxicology Centre post-doctoral fellow Dr. Yuwei Xie (PhD), engineering PhD student Mohsen Asadi, and research associates Dr. Femi Oloye (PhD) and Jenna Cantin.

The Public Health Agency of Canada (PHAC) has approached the team to talk about plans for a future when the seemingly unending pandemic finally subsides at least to an endemic illness in the population.

The wastewater project has now been incorporated as the Prairie Node in a National Monitoring Program co-ordinated and funded by PHAC. The federal agency will be funding chemical analyses and extending the current virus monitoring project by six months, Giesy said.

"Now that groups across Canada have all this equipment and trained a lot of people who have become experts in monitoring pathogens in wastewater, it would be very smart to keep these things going and monitor for other diseases that have been plaguing us for a while," said Brinkmann.

These include regular influenza as well as other infections especially prevalent in Saskatchewan, such as syphilis, HIV, and tuberculosis in the north, he said. As well, small communities struggling to deal with a deadly toxic drug epidemic can prepare in advance by tracking drugs in wastewater.

This future is thanks to a relationship between USask and the City of Saskatoon that began before COVID-19 arrived. Researchers and students from USask's Toxicology Centre were collaborating with Saskatoon's wastewater treatment plant staff on wastewater-related projects.

McPhedran, an environmental engineer and associate professor in USask's College of Engineering, and Brinkmann, assistant professor in the School of Environment and Sustainability at USask, have collaborated with the City of Saskatoon on several stormwater projects, including a couple of studies funded through the Natural Sciences and Engineering Research Council of Canada.

"Oftentimes the city is very engineering-oriented, and they contacted Kerry to say they'd like to work to be prepared for any future regulations on the quality of stormwater discharges," said Brinkmann.

"He worked on measuring heavy metals, that sort of thing. I could measure several other toxicants and our lab could do toxicity tests. The research on stormwater and wastewater kind of evolved from that," said Brinkmann.

The pandemic began in March 2020. Giesy, former Canada Research Chair in Environmental Toxicology, and Xie, who also works on the Global Water Futures environmental DNA (GWF eDNA) program, quickly developed a comprehensive system for detecting COVID-19 in wastewater in July 2020.

The accuracy of their method was validated in a study with eight other laboratories across Canada, co-ordinated by the Canadian Water Network and the Public Health Agency of Canada's National Microbiology Laboratory in Winnipeg.

Here is how COVID-19 is detected in wastewater. The virus is present in the feces of infected persons, even before they become symptomatic.

Researchers receive wastewater samples three times per week from the cities. The plants use automated composite samplers located at the inflow of the plants, with the computer-controlled devices sucking up a few millilitres of wastewater every 10 minutes or so into refrigerated bottles that fill up over 24 hours to be then taken to the lab.

The samples have to be collected at the right time, preserved properly and shipped to the lab, ideally within 24 hours.

"This is an RNA virus that degrades quickly in wastewater, so

how the treatment is done and where the samples are taken are really important,” said Giesy.

“Markus and I aren’t wastewater engineers, but the engineering side of things is really important. We rely on Kerry to tell us what we should do.”

The results are shared in a report to the city, public health officials, PHAC and the public via a dashboard.

Because the analysis provides a cost-effective, efficient and integrative measure of infected persons in the sewer-shed, it can reliably project trends in a community approximately seven to 10 days sooner than by public clinical testing.

Ventilation system upgrades reduce COVID-19 risk

CBC Saskatchewan – Some school divisions in Saskatchewan have been upgrading their ventilation systems since the start of the pandemic, but some question how effective these upgrades are to deal with the contagious Omicron variant.

“My short answer is that the improvements will work with Omicron,” said Carey Simonson, P.Eng., a professor of mechanical engineering at the University of Saskatchewan, in an email to CBC.

“It is important to note that good filtration and ventilation do not guarantee that COVID-19 will not spread; they only reduce the risk of becoming infected. The better the filtration and the higher the ventilation rate, the lower the risk.”

Overall, ventilation and filtration are important, said Simonson. However, people cannot rely on them entirely as a sole protection from the spread of the virus. Ventilation and filtration are “one piece of the whole strategy,” he said.

Simonson also explained there is not enough evidence yet to be able to design systems for a certain risk level at the moment, such as the newer and much more contagious Omicron variant of COVID-19.

“Better filtration and more ventilation would be needed to keep the same risk level with a more contagious variant.”

Even in newer schools, ventilation systems are originally not designed for infectious disease control, said the engineering professor in an interview with CBC.

Administrators of and mechanical staff at existing school buildings should put in the best filters they can, make sure they are installed properly, and, if there is not enough air exchange, maybe add portable HEPA filter units, said Simonson.

In January 2021, Regina Public Schools announced the completed installation of new air filtration systems in all its facilities. The multi-phase project began in September

2020 and cost \$1.39 million, with Regina Public Schools receiving financial support from the federal and provincial governments’ pandemic funding, the school division said in an email to CBC.

Greater Saskatoon Catholic Schools spent \$1.2 million on ventilation upgrades, according to this school division.

In an online COVID-19 guide about indoor ventilation from 2021, the Public Health Agency of Canada acknowledged that these devices might be considered as an additional protection, especially where enhancing ventilation is not possible otherwise.

“When properly used, portable air filtration devices with high-efficiency particulate air (HEPA) filters have been shown to reduce the concentration of some viruses from the air,” said the PHAC.

“It’s important to note that the effectiveness of portable air filtration devices in reducing the transmission of the SARS-CoV-2 virus hasn’t yet been demonstrated. As such, they should not be used alone or as replacement for adequate ventilation, physical distancing and hygienic measures.”



MentalFloss

Detection system for curling disabled at Beijing Olympics

The Canadian Press/Mental Floss — An issue with the batteries in the curling stones at the Beijing Olympics meant moving to the honour system for hog-line violations rather than relying on the electronic detection system in them.

The electronic detection system – known as “Eye on the Hog” – was developed in the 1990s by Saskatchewan engineering students. It is used to show that curlers have released their stone before the front of it crosses the first red line on the ice, known as the hog line. A magnetic strip is installed beneath the ice slightly behind the hog line. Inside the stone is an electrical circuit whose current is affected when you’re touching the handle.

The light initially flashes green. Release the handle before the stone reaches the magnet and at that moment, the flashing will switch to a steady green to indicate that the release was valid.

If the curler is still touching the handle when the stone crosses the in-ice magnet, the battery-operated red LEDs will be set off, meaning the curler has committed a hog line violation. The shot is disqualified, and the stone is quickly removed.

The system dates back to the late 1990s, when University of Saskatchewan engineering professor Eric Salt suggested that some of his advanced electrical engineering students invent one for a class project. With his help, they did, and Canadian engineering company Startco modified their design and brought it to market. The Canadian Curling Association soon adopted it for official use, and its popularity grew from there.

At the Beijing Olympics, a malfunction of the system was first discovered in the mixed doubles event and have also occurred during four-player team competition.

Before each throw, players grab the stone by its handle to clean the bottom of any frost or debris. A light flash from the top of the rock indicates sensor activation. The light should go out when the rock is set down.

However, curlers found the stones weren't activating when they were flipped over. They had to ask for umpires to walk to the hog line to do the job of the sensors, which costs the curlers time and is a distraction for them.

The batteries were removed from the handles, disabling the sensors in the stones.

Potash mine to reduce water use, eliminate tailings

CBC Saskatchewan – Construction is set to begin on a Saskatchewan potash mine with a far smaller environmental footprint than industry norms, according to Gensource CEO Mike Ferguson, P.Eng.

Gensource Potash says it will begin construction this year on its 'modular unit' this year near the village of Tugaske, roughly 150 kilometres northwest of Regina.

The company says it will be the first Saskatchewan mine to produce no tailings ponds, and will also use far less water than other mines.

"We really believe this is the beginning of a new era of potash production. This will be the way potash is produced in the future," Ferguson said.

A typical mine of this type requires four kg of water to produce one kilogram of potash, but Tugaske will need only about 1.5 kilograms. This will be accomplished through new technology and more extensive water recycling, he said.

Ferguson said new technology will also allow Tugaske to become the first potash mine in Saskatchewan with no tailings ponds. These often-massive surface level structures are used to store the salt and other waste products brought to the surface with the potash.

A typical mine of this type brings up two kg of salt waste for every kilogram of potash produced. The technology used at Tugaske will separate the potash before it's brought to the surface, Ferguson said.

Ferguson said construction will only take two years, in part because of the Tugaske's smaller scale. It's expected to produce 250,000 tonnes of potash per year, compared with larger mines that produce millions.

Saskatchewan Environmental Society vice-president Robert Halliday, P.Eng., said water use and salt waste are two of the big concerns with potash mines. He said the Tugaske project, "certainly sounds interesting."

Halliday noted Gensource also plans to generate power on site, which will further improve the environmental footprint.

Cameco restarting mine

CBC Saskatchewan – Cameco announced its plans to restart the McArthur River mine site and Key Lake mill sometime in 2022.

Uranium ore from the mine, which is about 630 kilometres northeast of Saskatoon, is processed at the mill, which is about 570 km northeast of Saskatoon.

Cameco president and CEO Tim Gitzel said that roughly 200 people had remained working at the two sites since the shutdown, doing care and maintenance. Once the two sites are fully operational, he expects them to employ around 900 people over the next year and a half.

The mining operation was suspended in January 2018, then shut down long-term in July 2018 due to a lengthy period of low uranium prices. Gitzel said uranium prices have dramatically risen since the decision was made to shut the two sites down – from \$17 per ounce in 2018, to a current price of \$42.

Gitzel believes that uranium will continue to be attractive as a green source of electricity.

"You can't throw any of the tools out of the toolbox," he said.

"We're going to need every source of energy that we have going forward and nuclear is going to be one of them."

The company expects that the McArthur River site will produce five million pounds (2.3 million kilograms) of uranium in its first year and will ramp up to 15 million pounds (6.8 million kg) by 2024.

News Beyond Our Borders



Strategy to advance geoscience

Natural Resources Canada – The Pan-Canadian Geoscience Strategy outlines Canada's intention to produce world-leading geoscience in order to meet the growing demand for responsibly sourced minerals and metals.

The strategy was developed by federal, provincial and territorial geological survey organizations across Canada and was recently endorsed by Canada's minister of natural resources. It represents a renewed commitment to improving collaboration and the availability and accessibility of public geoscience data and knowledge.

Five priority areas have been identified:

- advancing framework geoscience
- advancing information on mineral and energy potential
- facilitating access to online geoscience data
- supporting the training of geoscientists
- enhancing public literacy in geoscience.

These priority areas seek to increase the impact of geoscience by supporting robust science and data, developing skilled scientists and growing exploration and collaboration. This will support Canada's critical minerals strategy currently being developed.

Accessible geoscience data can help lower exploration costs, inform evidence-based land-use decisions and support geo-hazard risk management and climate change mitigation. This results in a more competitive minerals and metals sector and serving the public good.

The Pan-Canadian Geoscience Strategy can be viewed online at www.geologicalsurveys.ca/.

Hydrogen fuel cell-powered locomotive advancing

Trains/Canadian Pacific – Canadian Pacific (CP) released a video in January showing its hydrogen fuel cell-powered linehaul freight locomotive prototype known as H2oEL.

CP's Hydrogen Locomotive Program aims to develop North America's first line-haul hydrogen-powered locomotive. The program involves retrofitting a line-haul locomotive with hydrogen fuel cells and battery technology to drive the locomotive's electric traction motors. CP CEO Keith Creel said it will roll under its own power by the end of the year and then enter test service next year.

This is the first project to use fuel cells and batteries to power a freight locomotive's electric traction motors. The diesel prime mover and traction alternator are being replaced with hydrogen fuel cell and battery technology to power the unit's electric traction motors. Six 200-kilowatt fuel cell modules will provide a total of 1.2 megawatts of electricity to power the locomotive.

Creel said he was on an inspection trip last year when the "talented Dr. Mulligan" pitched the concept.

"He said, 'I've got an idea. I believe I can connect all these components and we can create the first-ever freight version of a hydrogen battery locomotive,'" Creel said.

Dr. Kyle Mulligan has a doctorate in mechanical engineering from the University of Sherbrooke, in addition to two degrees in computer systems and electrical and biomedical engineering. Mulligan went through CP's railroader training programs and is a certified conductor and locomotive engineer who understands both operations and technology.

"Sustainability to me means doing the right thing, not the easy thing," said Mulligan, who is leading the project as Chief Engineer, Railway Technology.

"The Industrial Revolution enabled a comfortable way of life, but that does not mean we can take it for granted. There are more efficient, cleaner and environmentally-friendly ways of achieving the same standards and goals in life."

Mulligan and a five-person team are developing the prototype locomotive in Calgary. Creel emphasizes this project is an experiment.

"And again, it may not work out. But I think it's the right thing to do," Creel said.

"We're not betting the farm on it, for lack of a better term."

Creel said he wants a hydrogen locomotive that has the power and range of a diesel-electric.

"I'm operationally minded," he said.

"Don't come to me with a solution that causes more headaches."

So if you don't get the range of a diesel locomotive, we're not going to have that discussion."

"For a modest investment, he said just let me prove the concept," Creel said.

"This has gone from concept to reality. We'll be running the locomotive this year. It will move this year. We'll be switching with it next year."

The \$15 million CP is investing in the project was matched by a grant from Emissions Reduction Alberta, which will fund the conversion of a switcher and a high-horsepower unit. Also included in the grant is funding for hydrogen production and fuelling facilities at CP's yards in Calgary and Edmonton.

The Calgary facility will include an electrolysis plant to produce hydrogen from water, with electricity supplied by CP's solar array. The Edmonton plant will include a small-scale steam methane reformation system that extracts hydrogen from natural gas produced in the energy-rich province. The facility will be built to accommodate equipment that can capture greenhouse gases.

CP will share information with locomotive manufacturers and, if the project is successful, see if they have an interest in building production versions of hydrogen locomotives.

World's most powerful magnet wins Japanese scientist major prize

BBC – Dr. Masato Sagawa has been named the 2022 laureate of the Queen Elizabeth Prize for Engineering.

The Japanese scientist invented the neodymium-iron-boron (Nd-Fe-B) magnet. This is the strongest permanent magnet in wide-scale use today, found in everything from cars to computers.

"The essence of engineering is that you have to deliver," said Lord Browne of Madingley, who chairs the QE Prize. He said Sagawa's manufacturing process gave him the edge – in the view of the judges – to win the prize.

"Scientists come up with lots of great ideas; the Higgs Boson, fantastic. But engineering has to do something, and Sagawa's innovation did this very successfully."

Nd-Fe-B is one of those indispensable materials, without which everyday life would be a lot less efficient.

The magnet's importance is only going to increase as the green revolution takes hold. The material will be at the operational heart of many renewables systems, such as wind turbines.

The market for Nd-Fe-B magnets is expected to be worth some \$20 billion by the middle of this decade.

Dr. Sagawa made his breakthrough in the early 1980s when the strongest permanent magnet at that time was a samarium-cobalt (Sm-Co) combination. But cobalt metal is a rare resource and Dr. Sagawa recognized that if a



solution could be found based on iron, a much cheaper and more useful product could be produced.

He accomplished this by combining iron with neodymium, which is the third-most abundant rare-earth element. The addition of the element boron raises the so-called Curie temperature – the point at which magnetic properties are lost. This is important for using the batteries in cars where the engine compartment can get especially hot.

Dr. Sagawa has won many awards for his innovation but he said this one topped the list. One of those prizes is the Institute of Electrical and Electronics Engineers' (IEEE) 2022 Medal for Environmental and Safety Technologies. He shares that with Dr. John Croat. The American independently arrived at the same material solution at the same time when working with General Motors.

The Queen Elizabeth Prize for Engineering has been called the "Nobel for engineering" and the recipient gets a cheque for more than \$800,000 Cdn dollars, along with a trophy that is presented by the Queen or her representative.

Dr. Sagawa has a BS and master's in electrical engineering from Kobe University (1966) in Japan and a doctoral degree in materials science from Tohoku University (1972). He began his career as a research engineer at Fujitsu Ltd., in 1972, working on magnetic materials for electric relays. He worked on the Nd-Fe-B magnet as private research for five years, patenting it in the early '80s, before joining Sumitomo Special Metals Co in 1982. In 1988, he founded Intermetallics Co. Ltd in Kyoto and became its president.

Fusion technology matured by B.C. company

Global News – General Fusion from Burnaby, B.C.

announced it has matured a technology that it says could lead to the world's first commercial fusion energy plant.

Darren Ross, a mechanical engineer at General Fusion, is one who has worked on its Magnetized Target Fusion (MTF) technology. It uses a swirling cylinder of liquid metal to safely compress and heat the required plasma to the right conditions.

"It's fascinating. It's great motivation to know you're working on a project that could change the world hopefully one day," said Ross.

"The consequences of stuff not working are remarkably high for us; there's a lot of pressure for us to perform."

Fusion power is a proposed form of clean energy generation that involves heating two substances – deuterium and tritium – until their atoms collide and fuse into helium and a neutron, which contain a substantial amount of energy. That energy can be harnessed and used to create electricity.

General Fusion's CEO said the company has achieved milestone targets for the prototype of its fusion demonstration plant, which can accommodate the extreme conditions of fusion, such as temperatures up to 150 million C.

"When you're trying to contain a plasma, which is a super-heated form of hydrogen, at conditions and temperatures at the centre of the sun ... it's very hard to think of putting it inside a machine and that machine lasting the lifetime of a power plant," explained CEO Chris Mowry.

"The temperatures and conditions just destroy any solid structure known to man, so by interposing this liquid metal wall, which also acts as a shield between this burning fusion plasma and the machine, you basically protect the machine," Mowry explained.

"That's an example of how this liquid metal vortex, as you called it, creates a path forward that actually solves the practical challenges that face making fusion a clean-energy technology."

General Fusion now plans to build a demonstration plant in the U.K., momentum that has attracted investments from Jeff Bezos, Shopify's Tobi Luke, Bill Gates and more.

"General Fusion is driving on a path where we could be putting a shovel in the ground on the first commercial plant before the end of the decade," said Mowry.

Record amount of fusion energy

BBC – European scientists say they have made a major breakthrough in their quest to develop practical nuclear fusion.

A record amount of energy has been extracted by

squeezing together two forms of hydrogen. This new record was set by the UK-based JET laboratory.

The lab's experiments produced 59 megajoules of energy over five seconds (11 megawatts of power). This is more than double what was achieved in similar tests back in 1997. That's enough energy to boil about 60 kettles' worth of water.

The significance of this record is that it validates design choices that have been made for an even bigger fusion reactor now being constructed in France.

If nuclear fusion can be successfully recreated on Earth it holds out the potential of virtually unlimited supplies of low-carbon, low-radiation energy.

Small modular reactors in might not be ready by 2030

CBC – Small modular nuclear reactors (SMRs) may not be ready in time to replace electricity generation lost from the phase out of coal power in 2030, a former N.B. Power CEO, Gaëtan Thomas, told a committee of MLAs.

The climate change and environmental stewardship committee is hearing from experts and stakeholders to develop recommendations for a new five-year provincial climate-change plan.

Thomas said getting to net zero in New Brunswick won't be possible without nuclear because wind and solar power are generated intermittently, so, there needs to be a more reliable, all-weather source of electricity to back them up.

"The reality is solar and wind will never be 100 per cent in New Brunswick. ... If you get out of oil, gas and coal, what else is there in New Brunswick?" said Thomas.

However, he said it's not a certainty SMRs will be approved by 2030 when coal is phased out. N.B. Power's Belledune generating station must stop burning coal by 2030 and the utility is looking for a way to replace electricity from the plant with an energy source that doesn't emit carbon dioxide and contribute to climate change.

Thomas pushed back when it was suggested that SMR technologies being developed in New Brunswick are unproven. He said it is getting the proper regulatory approval for its new fuel-handling requirements that won't be quick.

"That's new, and that, in some cases, will delay this by three or four years, and may get us in a situation where we cannot meet the targets for 2030 or 2035," he said.

He predicted that eventually, about one-third of New Brunswick's electricity will come from wind, a third will come from nuclear and a third will come from N.B. Power's hydroelectric dams and from hydro energy bought from Quebec and Labrador.

Saint John Energy vice-president Ryan Mitchell also appeared before the committee warning about SMRs. Mitchell told MLAs that the technology may take a long time and could prove expensive.



“The pathway to decarbonize the province and the electricity system is going to require many different solutions. There really is no silver-bullet solution. We do believe that there is a role for nuclear within that,” he said.

“We certainly would suggest there be caution in terms of the timing that solution would be available, and basically the cost that might be associated with that.”

Saint John Energy is now working on a wind farm on the western edge of the city that would produce about 15 per cent of the utility’s electricity and would save it about \$4 million annually.

Two companies operating in Saint John, ARC Clean Energy and Moltex Energy, have received tens of millions of dollars in taxpayer subsidies for their research from the federal and New Brunswick governments.

John Deere self-driving tractors touted as solution to rural labour concerns

CNET/The Verge – John Deere’s first fully autonomous tractor will be available in a limited rollout later in 2022.

Minnesota farmer Doug Nimz’s farm served as a testing ground that allowed John Deere’s engineers to make continuous changes and improvements over the last few years.

“It might surprise you, we have more software development engineers today within Deere than we have mechanical design engineers,” said Jahmy Hindman, chief technology officer for Deere & Co., said in a recent interview.

“That’s kind of mind-blowing for a company that’s 184 years old and has been steeped in mechanical product development, but that’s the case. We do nearly all of our own internal app development inside the four walls of Deere.”

The world got to see the finished tractor as the

centerpiece of the company’s Consumer Electronic Show (CES) 2022 press conference.

John Deere isn’t the first agriculture equipment maker to develop an autonomous tractor. But as the world’s No. 2 maker of agricultural equipment, it’s one of the most notable.

John Deere’s tractors have been capable of steering themselves for two decades – as long as the farmer still sits behind the wheel. That fact makes the move to a fully autonomous tractor less of a stretch for a farmer than other people operating other types of vehicles.

Two boxes – one on the front and the other in the back – contain a total of 12 stereo cameras and a graphic processing unit (GPU) that let a farmer control the machine from a smartphone, starting it with a swipe of a button and watching live video as the machine moves across a field.

That differs from most autonomous cars being tested, which use a depth sensor called lidar, while Tesla employs an array of cameras, sensors and radar. John Deere, however, believes that stereo cameras are the way to go. John Deere mounts a stereo camera pod on the front of the tractor and another pod on the back. Each pod has three pairs of ruggedized stereo cameras that essentially work like human eyes. Images are collected by both and are then combined to help the machine locate potential obstacles that are between 45 feet and 90 feet away.

At first, the new tractor system will only be able to till fields. By automating that task, John Deere hopes to take away one responsibility from farmers’ long lists of duties. And with tillage, if something happens to go wrong with the self-driving tractor, a producer has time to fix the problem before spring planting. John Deere views it as the simplest task to automate.

While some are concerned about the move to automation, for farmers, it is embraced as producers find workers in short supply and younger people moving to larger communities. Some believe autonomy may be the only way to ensure enough food is grown to feed the world.

John Deere’s plan for 2022 is to rent a full tractor and chisel plow to about 10 to 50 producers who have steady internet connectivity on their farms and have an interest in using the technology.

Later, the company will let farmers retrofit their tractors with the autonomous technology. It plans to support at least the past three years of tractors and may eventually support older machines. Because John Deere tractors have had self-driving technology for decades, configuring them to be fully autonomous is relatively easy, said Jahmy Hindman, chief technology officer for Deere & Co. It will take only about a day to install the equipment and test a machine before a farmer can take it home to use in the field.



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Calendar of Events

Below are some featured events. Please see the Events calendar online for a full list of events: <https://events.apegs.ca/>

SUMA Convention and Tradeshow

Regina, SK
April 3-6, 2022
<https://suma.org/events/conventions-and-tradeshows>

LEED Green Associate (GA) Training

On demand or live webinars on:

- April 23, 2022
- May 14, 2022
- June 2, 2022

<https://leadinggreen.com/online-leed-green-associate/>

Get to the Point: A Practical Writing Course for Technical Professionals

April 26 – May 12, 2022 (6 sessions)
<https://events.apegs.ca/events/106848>

CIM Convention

Vancouver, BC
May 1-4, 2022
<https://convention.cim.org/2022/en/home/>

Regional Centres of Expertise (RCE) Saskatchewan - 14th Annual Education for Sustainable Development Recognition Awards

Regina, SK
May 4, 2022
<https://saskrce.ca/recognition-event/>

APEGS 92nd Annual Meeting and Professional Development Conference

Saskatoon, SK
May 5-7, 2022
<https://events.apegs.ca/events/97783>

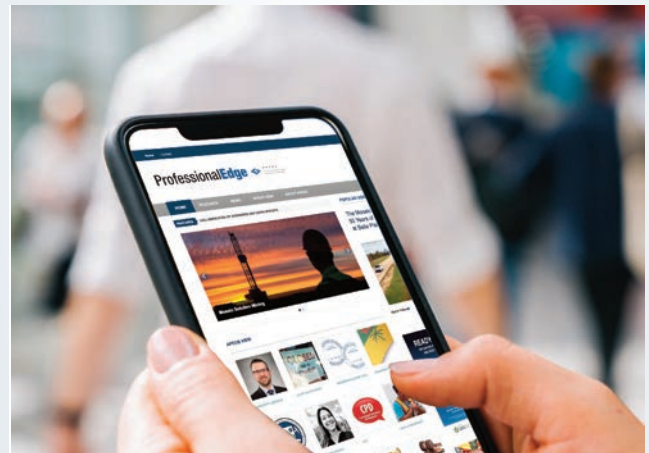
GeoConvention 2022

Calgary, AB
June 20-22, 2022
<https://geoconvention.com/>

2022 ASHRAE Annual Conference

Toronto, ON
June 25-29, 2022
<https://www.ashrae.org/conferences/2022-annual-conference-toronto>

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